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## TO OUR READERS

*We regret that, because of a dispute in the printing industry, to which we are not parties and which involves matters beyond our control, it has been necessary to reduce some features in this issue. The dispute may also result in delay in delivery.*

## Proposed New Station at Leeds

A NEW project has been announced by the North Eastern Region of British Railways; the combination of facilities now provided by Leeds City and Leeds Central passenger stations. This scheme, parliamentary powers for which will be sought by the British Transport Commission, will be described in greater detail in a future issue. Cost is estimated at £4½ million, and work, which is expected to take about four years, will be begun within two months. The re-modelling will include the following major works: entire reconstruction of City Station South, including provision of a new south concourse connected to the existing concourse at City Station North and provision of modern booking, inquiry and reservations offices, waiting room, toilet, and refreshment facilities; replacement of the present 16 platforms by 13 platforms, including two additional through platforms; provision of an overhead car park; enlargement and modernisation of the parcels depot, with provision of overhead barrow ways to platforms for parcels traffic; installation of colour-light signalling and a new central power-operated signal box serving the new station and surrounding approaches; improvement of telecommunications, including provision of a new automatic telephone exchange. Consideration is also being given to the development of a large office block round the new south concourse for letting. Central Station will be closed and the trains now using that station will be brought into the new City Station by a "fly-over" approach line from the existing Doncaster and Bradford-Leeds Central lines direct to the west end of City Station. This "flyover" will cross the existing line near Whitehall Road. The layout of the lines approaching City Station from the west will be re-modelled, including the provision of new lines connecting the former Midland and London & North Western approaches. The scheme is expected to effect considerable improvements to existing services. At present, Leeds suffers from a long-standing railway legacy; the arrangements provided by the two separate stations are uneconomic and inadequate for the heavy traffic offering. Although some improvements have taken place, notably the re-modelling of Wellington (now City) Station in 1937, facilities

today remain basically as they were before grouping in 1923. Much inconvenience to passengers is involved in changing from one station to another. The continuous growth of all classes of business, hastened in the case of passenger traffic by the introduction of diesel multiple-unit services, will be accelerated by the spread of dieselisation and facilitated by the new station, which also will enable services to be improved between Leeds and London. The project is of additional special interest in that it enjoys full local support and in particular, that of Leeds City authorities and Post Office, in conjunction with whom parts of the scheme have been designed. Present traffic congestion in the vicinity of the stations will be greatly eased by a system of one-way traffic and a roof car-park, accommodating 180 cars and capable of indefinite upward expansion and of downward expansion into a partly-disused tram depot.

## Obtaining Clearance in French A.C. Electrification

ELECTRIFICATION at 25kV, 50 cycles, of the 315-mile Paris-Strasbourg main line of the Eastern Region of the French National Railways is making good progress, but many difficulties in securing adequate clearance for the high voltage have been and are being overcome. In the 3,680-ft. Foug tunnel near Nancy, for instance, it was necessary to increase the clearance by nearly 20 in. This was achieved by lowering the track by 8-12 in. and cutting away the roof. Track lowering was made more difficult by a concrete invert added in 1905. Work in the tunnel nevertheless, was completed in less than 12 months. Two footbridges and two road bridges near Jarville had to be raised by jacking for distances of up to 19 in. The St. Jean bridge at Nancy, 226 ft. long and 57 ft. wide and weighing 1,300 tonnes, was lifted bodily about 18 in. For this latter operation 110 jacks, varying in capacity between 25 and 100 tonnes, were used.

## Heavy Deficit on Brazilian Railways

COMPARED with the previous year, 1958 was one of expansion for the incorporated railways of Brazil, the Rede Ferroviaria Federal S.A., but a heavy deficit was incurred. Revenue increased by 1,058 million cruzeiros to 8,944 million. The ton-mileage of freight rose by 5 per cent and passenger-km. by 6.8 per cent against the totals for 1957. The highest receipts were derived from the Central of Brazil (3,313 million cruzeiros), the Santos-Jundiaí (1,434 million), Parana-Sta. Catarina (1,097 million) and Leopoldina (701 million cruzeiros) Railways. Expenditure increased by 1,538 million to 18,280 million, so that the working deficit amounted to the formidable figure of 9,336 million cruzeiros, or some £25 million at the present free rate of exchange, compared with 524 million cruzeiros for the preceding 12 months. The deficit is covered by a Federal subsidy of 10,091 million. Wages accounted for 62 per cent of outgoings, although they were 263 million less despite increases imposed by the Government. All the railways recorded deficits. Meanwhile electrification, new construction and betterment works are reported to be proceeding.

## British Passenger Stock 50 years ago

ALTHOUGH standardisation of passenger vehicles on British Railways is helping slowly to reduce the number of varieties in use, that number is nothing like the number in Britain half a century ago, when every railway had its own specialities. Some of these designs were better riders than any standard coach today. The livery of all and its maintenance were incomparable. It was not uncommon for a coach to be given a dozen coats of paint. Many six-wheelers and even four-wheelers were at work, but by 1909 probably every regular express was composed of bogie, though by no means every one was composed of vestibule corridor, stock. At that time there were still East Coast Joint Stock double-berth first-class sleepers with the berths side by side. The Great Western was running its 70-ft. elliptical 32½-ton stock. The 12-coach 2 p.m. out of Euston had its pair of 12-wheel 65½-ft. diners. The Caledonian had its handsome "Grampian Corridor Express" of 12-wheel stock weighing 38 tons a coach. The Great Eastern even had 12-wheel six-a-side suburban carriages. The Great Central, then 10 years old, had managed to get the owners' nameplates off its original grey-and-chocolate coaches, and had returned to the varnished teak of its predecessor, the Manchester, Sheffield and Lincolnshire.



## The Canadian Pacific Railway in 1958

WE have received from Mr. N. R. Crump, President, a copy of the 78th annual report to the shareholders of the Canadian Pacific Railway Company, signed by him on behalf of the Directors; it covers results and developments in 1958. Though Canada's volume of industrial production decreased in that year with a corresponding reduction in demand for many railway services, real progress was made in the use of modern methods, and a reduction in expenses matched the fall in revenue. The result of the disputed need for firemen on goods and shunting diesel locomotives, the integration of handling less than wagon-load and express (parcels) traffic, and the growing success of the piggyback service combined to promise steady increase in efficiency and service.

In spite of an increase of \$7,900,000 (£2,750,000) in revenue during 1958 and the nine-day strike in 1957, railway revenue was 4 per cent lower than in the latter year. Freight ton-mileage fell by only 1.5 per cent, a lesser decline than in revenue, as there was actually a major increase in the movement of low-rated grain and its products while higher-rated general traffic decreased. Measures to control expenditure and effect economies by the use of more efficient equipment and methods limited the decline in net earnings to \$1,800,000 below those in 1957. The rate of return on net investment in railway property was 2.7 per cent.

Some of the principal results in 1958 as compared with those in 1957 are given below:

	1957	1958
	\$	\$
Railway passenger revenue	38,638,842	35,394,437
Railway freight revenue	408,600,810	393,823,285
Railway gross revenue	487,565,479	467,410,853
Railway working expenses	449,319,097	430,919,006
Railway net earnings	38,246,382	36,491,847
Other income	23,441,276	13,408,712
Fixed charges	*	16,997,521
Net income	**46,800,000	32,903,038
Dividends	24,119,422	24,286,501
Balance	22,666,291	8,616,537

\*No figure available

\*\* Approximate figure

Of the roughly \$20,000,000 decrease in gross revenue about \$15,000,000 were due to lower freight receipts, but extended common carrier piggyback services added \$4,500,000 to revenues; freight rate increases added \$7,900,000. The number of passengers carried dropped from 8,000,000 to 7,700,000 and the average journey from 166 to 148 miles. The satisfactory decrease in operating expenditure was achieved despite an enhanced wages bill of \$9,700,000. Maintenance of structures was some 3 per cent less costly than in 1957 and track maintenance was unaltered. Equipment maintenance also was 2 per cent lower, notably in wagon repairs which were 6 per cent less. Transportation expenses declined by 5 per cent and this was the fourth successive annual reduction. The increased use of diesel locomotives and railcars resulted in a saving of some \$10,600,000 in wages and fuel costs. The proportion of total transportation work carried out by diesel power during the year averaged 89 per cent on goods train service and also in shunting and 91 per cent in passenger service. Operating efficiency is shown by the fact that gross ton-miles per freight-train hour were 57 per cent higher than in 1948.

The finding of the Royal Commission that firemen need not be employed on freight and shunting duties was implemented by the company early in the year. A three-day strike called by the firemen's union in May ended by the signing of an agreement. This provided that firemen having a seniority prior to April 1, 1956, would continue to work as such but would not be replaced, whereas the employment of those with later seniority would be terminated, but they would be given preference for re-employment in other capacities.

During the year under review 122 diesel locomotive units were acquired, namely, 106 diesel-electric main line engines, and 11 diesel-electric and five diesel-hydraulic shunters. Also, 2,091 freight wagons, 300 refrigerator vans and 12 diesel railcars were placed in service; altogether there were 55 of these railcars in service at the end of the year operating over some 4,400 route-miles. The new wagon stock included 300 flat wagons equipped for piggyback service. This service previously working between Montreal and Toronto was extended to New Brunswick, to the head of the Great Lakes, and into Western Canada during the year.

In that period also two new lift bridges and other works necessitated by the St. Lawrence Seaway were almost completed. An 87-mile section of the line between Montreal and Toronto was equipped with C.T.C., and an additional 53 route-miles were equipped with automatic block signals, bringing the aggregate mileage so controlled to 3,267. In all 547 miles of relaying were carried out in 1958.

An important move was acquisition during the year of control by the C.P.R. of Smithson's Holdings, Limited, owners of Smith Transport Limited, the largest road-haulier concern in Canada, and of other road-transport companies. This assisted in giving top-priority to the co-ordination of road and rail operation with a view to complete integration of freight services. A new department was also created to reconstitute the organisation, administration, methods of operation, facilities and equipment to meet these changes; it is known as Merchandise Services. During 1958 no fewer than 591 new businesses were established on or adjacent to the C.P.R. lines; 151 of them demanded private sidings totalling 31 miles of track. The extension of the Royal York Hotel, adding 400 new rooms—bringing the total number up to 1,600—and providing additional banquet and convention facilities was nearly completed, and was, in fact, opened in February, 1959.

## A Link in India's Five-Year Plan Policy

WITH the launching of the Indian Second Five-year Plan, a decision was reached to establish great steel plants at Rourkela and Bhilai on the Calcutta-Nagpur main line of the old Bengal-Nagpur Railway, now part of the South Eastern Railway. It therefore became essential to provide a more-direct independent rail route to carry coal from the Bihar coal-fields—and the Bokaro field in particular—to these plants. The route recommended at that time ran from Barkakana Junction, on the Gomoh-Daltonganj loop of the Eastern Railway, southwards to Ranchi (the former capital of Bihar & Orissa) and thence south-westwards to Bondamunda, the next station east of Rourkela on the S.E.R. main line, and 250 miles from Howrah, Calcutta.

Later, however, it was decided to establish a 2,500,000-ton steel plant on the south bank of the Damodar River about three miles from Chandrapura, another station on the Daltonganj loop line and only a few miles south-west of the important junction of Gomoh on the Grand Chord line of the E.R., the main route from Calcutta to Delhi. Chandrapura is about 50 miles east of Barkakana and in the Bokaro coalfield. Moreover, a coal-washery is being constructed at Dugda near Chandrapura and also a heavy-machine-building plant at Hatia adjoining Ranchi. These important developments at once necessitated a change in the route of the new railway to run from Chandrapura instead of from Barkakana. It will therefore carry a heavy coal traffic from the Bokaro pits first across the Damodar to the new steel plant on its banks and to the nearby washery, and also 184 miles to Bondamunda and Rourkela and to Bhilai some 250 miles farther west along the S.E.R. main line. There will also be important return loadings of iron-ore and limestone destined for the Hatia and Bokaro (Chandrapura) plants. So heavy is the traffic expected to be that the line is designed so as to be able, if necessary, to work trains of up to 7,000 tons, each with four electric locomotives. The route followed by the line passes through Muri Junction—on the Chandil-Barkakana branch of the S.E.R.—Ranchi and Hatia to Bondamunda.

Construction is being carried out by the Eastern Railway and is well in hand. The line is expected to be open from Chandrapura to Muri this year and to Hatia by March, 1960. The remainder is expected to be completed in the Third Five-year Plan period.

Obviously this is one of the most important railway constructions undertaken in India of recent years, especially in view of the heavy traffic it is designed to carry, the 5 ft. 6 in. gauge, and the long continuous 1 in 100 gradients that have to be faced not only by the southbound coal traffic but also by the great volume of iron-ore and limestone northbound for the Bokaro steelworks. Incidentally, considerable credit would seem to be due to the survey engineers for completing their extremely onerous tasks—both preliminary and final location—in a single season.



## THE SCRAP HEAP

### Safety by Rail

When the Czar goes to Poltava, Southern Russia, troops will line 2,000 miles of railway to protect him from possible terrorists.—From the "Daily Mail" of June, 1909.

### A "Legal" Strike in 1899

Six hundred native signalmen on the Great Indian Peninsula Railway left work on May 6. The men, who alleged that they had numerous causes of complaint, presented their chief demands, including increased pay and allowances, to the company last week, in the form of an ultimatum that avoided penal consequences by giving 24 hours' notice of their intention to strike. The company is now employing military signalmen, and the service will only partially be disorganised by the strike. Small stations are being temporarily closed. There are many applicants for the vacant posts.—From "The Financial Times" of May 8, 1899.

### Tributes to Pioneers

Many engineers who attended the recent official opening by the Earl of Northesk of the new laboratories for the British Rolling Mills Limited, co-operated with the Newcomen Society to unveil tablets commemorating the work of pioneer engineers. The new laboratories are on the site at Bloomfield, Tipton, Staffs, of the first commercial beam engine to the designs of James Watt, built in 1776, and a tablet to commemorate the event was unveiled by Lord Northesk in the presence of the Mayor of Tipton. The party went on to Stourbridge, where the original erecting shop

of the firm of Foster, Rastrick & Co. is now owned by John Bradley & Co. (Stourbridge) Ltd. In these works were built the *Stourbridge Lion* (1828), the first locomotive to run in North America, and the *Agenoria*, which opened the Shutt End Railway, Kingswinford, on June 2, 1829. After inspecting the Works, Lord Northesk unveiled another tablet on the wall of the original building.

John Urpeth Rastrick (1780-1856) played an important part in the introduction of steam-operated railways. In the same year, in which he set the *Agenoria* to work, he was also one of the judges appointed by the directors of the Liverpool & Manchester Railway at the Rainhill trials which vindicated Stephenson's *Rocket*. Much of Rastrick's work was in the sphere of civil engineering, and probably his best-known achievement was the Ouse Valley Viaduct on the London to Brighton main line.

### Travel Rationing?

The day may come when people may be able to visit coastal areas only if they have a permit, Mr. J. Jefferson, West Sussex county planning officer, said at the spring conference of the Town Planning Institute at Southport. Traffic congestion now, he added, was nothing to what it was likely to be. Although some sort of rationing or permit system for people to visit certain areas seemed unthinkable, something had to be done or the situation would get entirely out of control. . . . Roads and other facilities were totally inadequate, but if the roads were widened and other improvements made "it would alter the character and charm of many of the secluded seaside

areas—the very thing which attracts the people."—From "The Times."

### Not Enough

A man who pleaded guilty by letter at Harrow to two cases of railway fraud, sent £3 to the court saying he hoped it would be enough to cover the fines. It was not. He was fined a total of £6 with four guineas costs. Ticket inspectors spent a total of 14 hr. watching him, the court was told. He had bought a 3d. single ticket at Barons Court and travelled to South Harrow.—From the "Evening News."

### Brunel at Work

Writing in *The Times* recently, Mr. R. E. Martin recalled the time when, as an engineer's apprentice with the firm of Sir Douglas and Francis Fox, he was working on the Manchester, Sheffield & Lincolnshire Railway extension to London, afterwards the Great Central. The contractors for the length between Rugby and Woodford had on their strength an old man known to his mates as Uncle Tom Perkins. He told Mr. Martin once that in his young days he had worked on the building of the Cornwall Railway and that he remembered, during the construction of the Saltash Bridge, seeing Brunel in his yacht, anchored in the middle of the Tamar, signalling with flags to the gangs on shore who were hoisting with large screw-jacks the great tubular girders which still form the main members of this most remarkable structure.

### The "Also Rans"

You will not find our names in lights  
Or on the scroll of fame.

The tide of fortune ebbs and flows  
And leaves us much the same.

Yet, in our inmost heart of hearts,  
We have our proper pride;  
Although we haven't cut much ice,  
At any rate, we've tried.

We have not scaled the dizzy heights  
To view the landscape o'er;  
Our outlook may be bounded by  
The booking-office door.  
But we can still console ourselves,  
When life seems dull and slow,  
For, if we all were V.I.Ps,  
Who'd get the trains to go?

Oft have I wondered wherein lies  
True aristocracy;  
Is it to be, whate'er betide,  
The best that one can be?  
We do our best, day in, day out,  
With precious little fuss,  
We must be quite important, too—  
There are such lots of us!

A.B.

### Last of the Hill of Howth Tramway



Photo]

[J. H. Price

Car of the Hill of Howth Tramway, recently closed, approaching terminus at Sutton Station, C.I.E. The tramway was built by the former G.N.R.(I) and opened in 1901

## OVERSEAS RAILWAY AFFAIRS

(From our correspondents)

### VICTORIA

#### Tourist Bureau

The Victorian Government Tourist Bureau has passed from the control of the Victorian Railways to the newly created Tourist Development Authority. The Tourist Bureau, which had been developed into Australia's biggest travel agency, is continuing to sell Victorian and interstate rail travel and be the distribution centre for railway produced literature.

#### Superphosphate Traffic

The Victorian Railways carried the biggest quantity of superphosphate for March since 1939. The month's tonnage at 129,814 was 5,646 tons greater than for the corresponding month of the previous year, despite the fact that loading ceased during the Easter holidays which, last year, were in April. Since July 1, last year, the Railways have conveyed 371,265 tons of fertiliser. This is 33,312 tons less than for the corresponding period of the previous year owing to lack of orders between July and December.

### FRANCE

#### Government Credits for S.N.C.F.

Under the Finance Law for 1959, the National Railways were allocated fr. 8,300 million (£6,100,000) for reconstruction, fr. 19,500 million (£14,300,000) for electrification and fr. 20,400 million (£15 million) for other works. These credits are exclusive of investments in rolling stock or normal maintenance, and they compare with fr. 7,100 million,

24 million, and 17,500 million respectively in 1958. The general level of credits envisaged for the S.N.C.F. covering the years 1958-1961 is widely criticised as being too low to enable the railways to continue their existing rate of development.

#### Staff Suggestions Scheme

Out of a total of 1,988 suggestions made by S.N.C.F. employees in 1958 under the official scheme, awards were made in respect of 1,090. This was the highest number of awards made in any year since the scheme was inaugurated. Of 2,266 suggestions made in 1955, awards were only made in respect of 856. Awards are on a Regional basis, but supplementary all-line awards totalling over £220 were made recently for the best four suggestions.

#### Bridge Removal at Lyons

In connection with track work at the junction of the Paray-St. Germain-Mont d'Or and Paray-Givors lines just south of Lyons, construction of a new railway bridge over the road near Lozanne was by Army engineers. A temporary girder bridge, 79 ft. long and weighing 45 tonnes, was installed to assist in the early work, after which it had to be removed. To carry out this work use was made of a tracklaying machine weighing in all 305 tonnes and with an overall length of approximately 288 ft. This machine, mounted on 26 axles, was positioned at one end of the bridge from where it lifted the bridge bodily on one of its two extended jibs, and deposited it on a rake of flat wagons on the adjacent track. This was carried out in 20 min. The tracklaying machine is

operated by a 208-h.p. diesel engine feeding a number of motors.

#### Earlier End of Summer Service

As an economy measure, several seasonal expresses which usually continue until the end of September will this year terminate on September 14 or 15. The principal services concerned are those from Paris to Dinard, St. Malo, Dives-Cabourg, Royan, Evian, and St. Gervais, and the cross-country services Bordeaux-Quimper, Lyons-La Rochelle, and Strasbourg-St. Gervais.

### WESTERN GERMANY

#### Power Signalling at Würzburg

The four signalboxes originally in service at Würzburg main station have been replaced by a single Siemens & Halske type relay interlocking installation with push-button desk panel controlling 163 sets of points, 71 running, and 165 shunt signals. The apparatus room contains 9,800 relays; the total length of cabling and wiring exceeds nine miles. Automatic signalling is in operation on the four routes to the marshalling yard, Rottendorf, Heidingsfeld, and Gemünden. Remote control with automatic route setting of the layouts at Rottendorf and Heidingsfeld will later be installed and the dispatch of trains approaching from Zell and Veitshöchheim will then be under the direct control of the new central signalbox. The illuminated train number describer system is in use throughout the work, with supplementary indications covering any late running of a particular train. This equipment is used to relieve the signalman of certain routine operations, now effected automatically, such as clearing of signals and so on.

### SWITZERLAND

#### Cadenazzo - Luino Electrification

Before the opening of the present main line from Giubiasco (Bellinzona) through Lugano to Chiasso and Como, the continuation of the Gotthard line into Italy was along the east shore of Lake Maggiore to Luino, just across the Italian frontier, where a junction was effected with the Italian system. There has been electric traction as far as Cadenazzo, the junction for Locarno, for some years past, but the Cadenazzo-Luino section has still remained steam-worked with Swiss Federal 2-10-0 locomotives, supplemented recently by diesel-electric locomotives of the Bm 6/6 type.

The decision has now been made to electrify from Cadenazzo to Luino, including the short section of the Italian State Railways from the frontier near Pino into Luino, on the Swiss Federal 15,000-V system throughout. From the introduction of the summer timetable in 1960, the line will be electrically operated, and it is then intended to divert some of the Gotthard traffic by this route.

### Main-Line Diesel Traction in Ceylon



The up "Udarata Menika" express leaving Haputale at 5,000 ft. hauled by 5 ft. 6 in. gauge Brush AIA-AIA 1,250 h.p. diesel-electric locomotives in multiple-unit operation, Ceylon Government Railway

## ELECTRIC RAILWAY TRACTION SECTION

### Kent Coast Electrification and Modernisation

THE most urgent major undertaking of the Southern Region of British Railways under the British Transport Commission Modernisation Plan has been the electrification and modernisation of the Kent Coast main line. Besides its considerable goods and passenger traffic to and from the Maidstone and other feeder lines, it directly serves all the north and east Kentish coast resorts, with a combined population in winter of some 150,000; the Medway Towns area, of some 200,000 population; and one of the fastest-developing dormitory areas in the country, in such vicinities as St. Pauls and St. Mary Cray, and the many other new housing estates near Rochester, Chatham, and elsewhere. It is also an alternative route for Dover Continental boat-trains via Canterbury.

The line was constructed hurriedly by the London, Chatham, & Dover Railway for competitive reasons, with severe gradients and, in places, sharp curvature. It was, however, long ago recognised that at least the London-Medway Towns section was well suited to electrification, an undertaking that was completed as far as Gillingham in 1939.

Though this facility went a long way towards solving the problems of that section of the line at the time, its effects were nullified by an out-of-date signalling system and track limitations, especially east of Bickley Junction where there were only two tracks throughout. With the phenomenal postwar development of the areas served, the problem of carrying simultaneously rush-hour long- and short-distance season ticket passengers and those in expresses from North East Kent rapidly became acute. Nor had the electrification secured any relief for traffic beyond Gillingham which was also developing rapidly in some directions.

The British Transport Commission modernisation plan, announced four years ago, offered a welcome opportunity for the extension of electrification, widening, modern signalling, and junction improvements needed to speed up all classes of traffic. Because of the magnitude of the scheme and the many complications arising, Mr. C. P. Hopkins, the General Manager of the Southern Region, set up an Electrification Committee under the Chairmanship of Mr. S. A. Fitch, composed of the departmental officers concerned, together with an officer of the B.T.C. to review progress and to resolve difficulties as they arose. The committee reported to the General Manager to enable him to make policy decisions as quickly as possible. By means of this set-up proposals were sufficiently developed for submission for approval in principle to be made to the B.T.C. in January, 1956. This was given in February of that year, and from that time, the actual implementation of the scheme went forward.

Besides the installation of the Southern Region standard 750-V. d.c. electrification equipment from Gillingham to Ramsgate, Dover via Canterbury, and Sheerness, the work included widening and other line improvements—such as the elimination of bottlenecks and speed restrictions on curves—installation of colour-light semi-automatic and remote controlled signalling and the construction of electric traction rolling stock.

To enable the new electric services to operate with the maximum efficiency the entire route from Factory Junction to Ramsgate, via the main line and the Catford Loop, has been re-signalled, enabling some 30 boxes to be abolished and others to be closed at certain hours. Eight new power signalboxes have been opened; all but one are of the panel type. Magazine train described apparatus and signal post telephone communication have also been installed everywhere.

The Sheerness branch is now normally controlled remotely with the aid of electronic apparatus from Sittingbourne, but the outlying locations can be operated individually from their own panels should need arise. The numerous alterations to tracks and station layouts required to provide, among other things, for the longer trains and introduce alternate, or up and down, four-track working between Shortlands and Swanley, has necessitated an appreciable amount of temporary signalling work, while the change to the colour-light system has occupied

many successive week-ends. Spread over 97 miles of route, there are over 980 track circuit sections, nearly 400 colour-light and some 280 shunt and subsidiary signals, 84 junction indicators, 158 sets of power-operated points, many double or multiple ended, and 26 new relay rooms in addition to those found in the new power signalboxes. The new signalling follows principles standard in the Region for some time and found to give every satisfaction. Its benefits will be felt immediately, but will become even more noticeable when the close of the year brings with it the inevitable bad weather, with liability to fog, something which of late years, because of changing circumstances, has given rise to more than ordinary difficulty in operating this class of traffic under older methods.

The new rolling stock for the line consists of 53 four-car electric express units and 63 two-car units for intermediate services. Unlike the Brighton-line units, which have no communication between the two halves of a 12-car train, the four-car Kent Coast units are designed so that the corridor connection runs the whole length of each train. One buffet car can, therefore, serve the whole train. The express and intermediate units are able to run in multiple with one another and with the more recent suburban stock, although their speed characteristics are different. This is a facility which has already been found valuable in the units recently put into service on the Brighton, Eastbourne, and Littlehampton lines.

The traction motors are electrically identical with the standard used since 1951, but have roller suspension bearings so that the plain oil-lubricated bearings may be eliminated entirely from this stock, mainly in the interest of maintenance. Only one motor generator set and battery is provided on each of the four-car units as compared with two on previous express sets. The changes to these new standards have produced capital savings of some £200,000, and it is confidently expected that maintenance will be cheapened and reliability improved.

The two-car intermediate-service units resemble those now in service on the Sevenoaks line. They have one semi-saloon coach drawing a corridor trailer with first- and second-class compartments and two lavatories; there is no vestibule between the cars.

For the electrified lines power is supplied from the grid at 33 kV. a.c. and fed to substations through oil-filled 33-kV. cables. The current is transformed and rectified at 750 V. d.c. at the substations which are spaced at 3½-mile intervals. Twenty-three substations have been built for phase 1 of the scheme, equipped with both pumpless, steel-tank, mercury-arc rectifiers and glass-bulb mercury-arc rectifiers. This follows the practice adopted in the London area change-of-frequency scheme. Substations and track-parallel huts in both phases will be under remote supervisory control from control rooms at Canterbury and Paddock Wood.

For the accelerated service, the Victoria expresses will split at Gillingham, the leading portion will go to Ramsgate and the rear portion to Dover. When there is a buffet car it will stay with the Ramsgate portion. The Victoria-Ramsgate service will be increased by about a third, and new services from Charing Cross introduced for Ramsgate, and from Victoria for Dover and Sheerness.

It is difficult to estimate at this stage, what the service requirements will be for phase 2 of the electrification. It is, however, probable that express trains will run every 2 hours between Charing Cross and Ramsgate, calling at Waterloo, non-stop to Ashford, where three coaches will be detached for Margate via Canterbury West. The front portion of these expresses would then work round the coast via Folkestone and Dover to Ramsgate, while the rear portion proceeded via Canterbury West to Ramsgate and Margate.

Over the past few years, passengers travelling on the Kent Coast line have been subjected to all manner of hardship and inconvenience as a direct result of the electrification and modernisation work. The Southern Region has done all in its power to alleviate these difficulties. The very considerable extent of the civil and electrical engineering undertaking, and the remarkable rapidity with which it has been carried out reflect great credit on all concerned.



## Southern Region Kent Coast Electrification

*Extension of electrification from Gillingham to Ramsgate via Faversham, the branch from Sittingbourne to Sheerness, and the line from Faversham to Dover Marine*

**E**LECTRICAL energy for the extension of electrification in the Southern Region of British Railways from Gillingham to Ramsgate via Faversham, the branch from Sittingbourne to Sheerness, and the line from Faversham to Dover Marine, which comprises phase 1 of the Kent Coast electrification scheme, is obtained from the Central Electricity Generating Board grid substations at Sittingbourne, Thanet, Canterbury, and Folkestone at 33 kV. three-phase alternating current, and distributed by railway owned oil-filled cables to 23 mercury-arc rectifier substations where it is transformed and

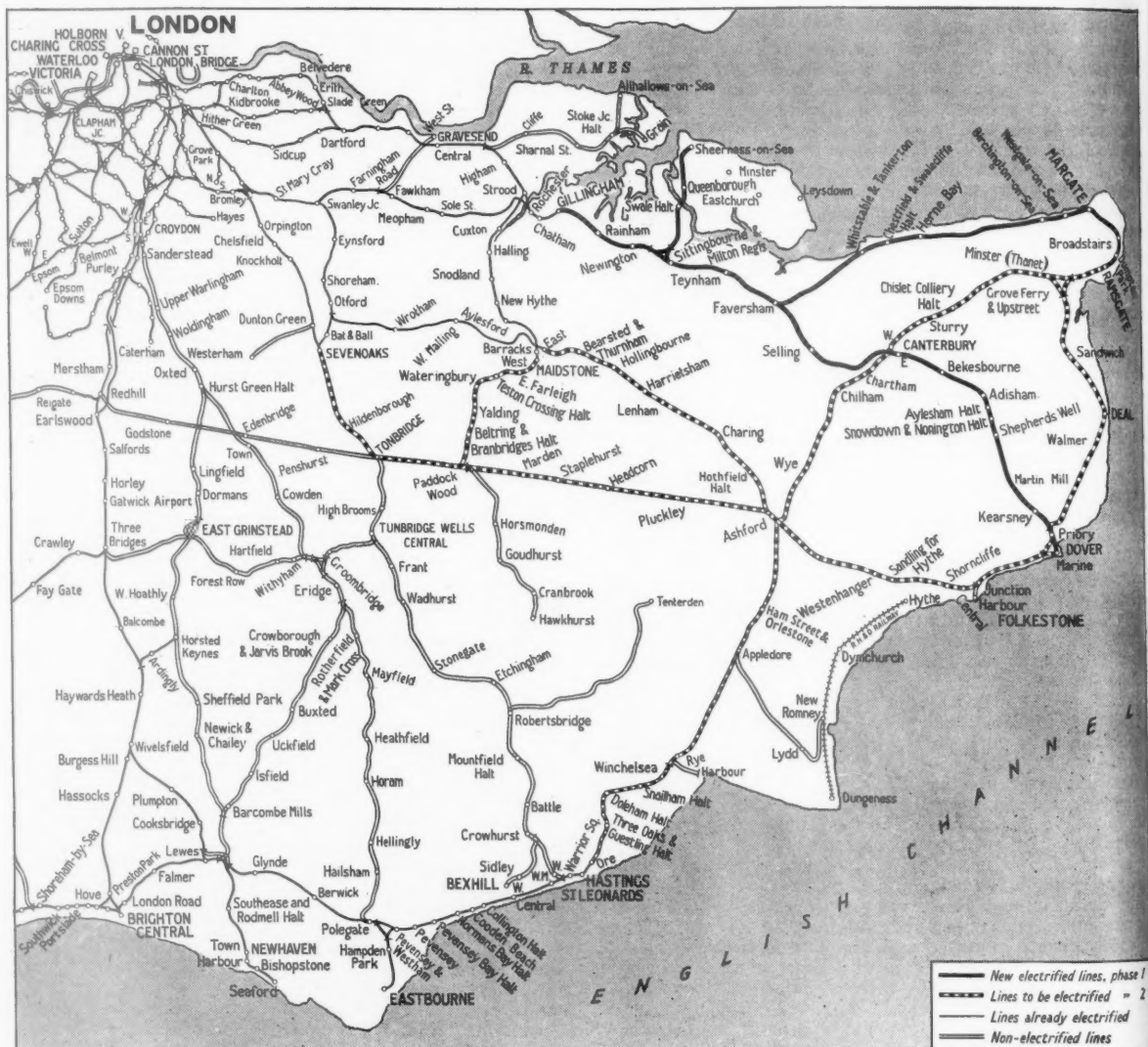
converted to direct current at a nominal pressure of 750 V.

The 33 kV. cables are arranged on the ring main principle and form an extension to the high voltage distribution systems in the existing electrified areas. This has the effect of greatly reducing the risk of failure of traction or signalling supplies due to a breakdown on the high voltage side.

The brick built substations contain indoor-type 33 kV. 750 MVA. rupturing capacity switchgear, single or twin unit 2,500 kV. mercury-arc rectifiers either of the glass bulb, or of the pumpless, air-cooled, steel-tank type with their asso-

ciated transformers outside the buildings and high speed circuit breakers of 3,000 A. continuous rating for controlling the 750 V. d.c. supply to the track.

The actual electrification of the track is by a third rail connected to the positive pole with return via the running rails as employed in the existing electrified areas of the Southern Region. The conductor rail is 150 lb. on the boat train routes and 106 lb. elsewhere and is normally situated in the 6 ft. way. In place of fishplating and bonding considerable use has been made of welding the conductor rails in lengths of up to  $\frac{1}{4}$  mile, centrally anchored, and with expansion



Map showing lines electrified under phase 1, and lines to be electrified under phase 2, of the extension of electrification in Kent

gaps bridged by flexible bonds, between adjacent lengths.

### Track Paralleling Huts

Midway between substations, track paralleling huts, sometimes referred to as track sectioning cabins, have been built, equipped with high-speed circuit breakers similar to those installed in the substations. These serve the dual purpose of improving the current supply characteristics and also provide useful additional points at which the track can be sectioned. For further sectioning of the track, pole-operated hook switches are installed in the conductor rail system at strategic points such as crossovers.

All the substations and track paralleling huts are unmanned and are controlled by remote supervisory control equipment from a central electrical control room near Canterbury West Station. In this building the operator and assistant operator sit at a large desk, equipped with telephones, meters, and indicators, facing a control diagram 33 ft. in length, which displays the whole of the area for which they are responsible. Any change in aspect of the equipment in the substations or track paralleling huts is immediately indicated on the diagram by the flashing of the appropriate lamps and the sounding of an audible alarm. Switching operations can be rapidly carried out on any part of the system by the operation of miniature keys on the diagram.

### Supervisory Control Equipment

The equipment, which operates with 50 V. d.c. from storage batteries, is in many respects similar to automatic telephone exchange equipment but incorporates a number of safeguards against wrong numbers which might result in a wrong switch being operated. The signals from the control room to the substations and track paralleling huts are transmitted over dry-core trunk-type telephone cables which also serve as pilot cables for the protection system of the 33 kV. cables. The pilot/supervisory



Westgate substation during construction, showing transformer

cables are laid in the same route as the 33 kV. cables and the type of route most commonly used consists of a reinforced concrete trough laid in the cess with the lids just above ground level.

For connection to and between conductor rails 1 sq. in. butyl rubber-insulated, polychloroprene - sheathed cables have been used. For further protection these are encased in wooden trunking laid at ground and ballast level.

To overcome the objection to the presence of a conductor rail in those portions of goods yards and sidings where shunting staff are concentrated a certain amount of overhead contact conductor has been installed. In most cases tubular steel poles with cantilever arms or span wires have been employed but where this method is impracticable welded tubular steel gantries have been used.

To ensure adequate conductivity for the return current the joints in running rails have been bridged by copper bonds and cross bonding between rails and

between tracks ensures that all available running rails are used for the return current.

Ancillary supplies, mainly for signalling purposes, are provided from each substation by two auxiliary transformers of 30 kVA. capacity incorporated in the 33 kV. switchgear and supplied from the two incoming feeder cables.

The design, construction, and installation of the whole of the power supply equipment has been the responsibility of Mr. H. S. Smyth, Electrical Engineer, to the requirements of the Chief Mechanical & Electrical Engineer, Mr. W. J. A. Sykes, in consultation with the Chief Electrical Engineer of the British Transport Commission.

The principal sub-contractors are as follow :—  
Bertram Thomas (Engineers) Limited

Direct current high-speed circuit breakers and associated equipment in area "A" substations and track paralleling huts

33 kV. switchgear in area "B" substations, and direct current high-speed circuit breakers and associated equipment in area "B" substations and track paralleling huts

Storage batteries and charging equipment in Canterbury control room and area "A" substations and track paralleling huts

Overhead contact line equipment in yards and sidings

33 kV. switchgear, transformers, and steel-tank mercury-arc rectifier equipments in area "A" substations, and remote supervisory control equipment in Canterbury control room and in all substations and track paralleling huts

Transformers and glass-bulb mercury-arc rectifier equipments in area "B" substations

33 kV. oil-filled cables and pilot/supervisory cables for phase I  
Storage batteries and charging equipment in area "B" substations and track paralleling huts

So far as phase 1 is concerned, area "A" comprises Gillingham to Ramsgate and the Sheerness Branch, and area "B" covers Faversham to Dover.

The British - Thomson - Houston Co. Ltd.

Chloride Batteries Limited

Clough Smith & Co. Ltd.

The General Electric Co. Ltd.

Hackbridge & Hewitt Electric Co. Ltd.

W. T. Henley's Telegraph Works Co. Ltd.

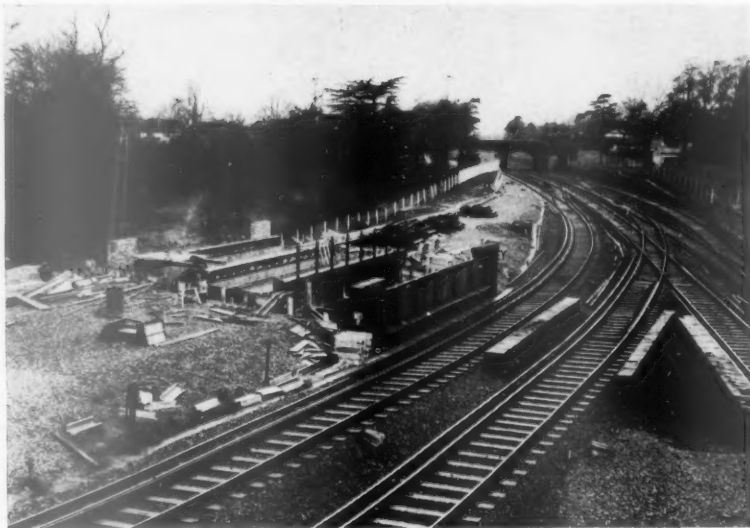
Pritchett & Gold & E.P.S. Limited



Control desk and diagram in Canterbury Control Room

## Civil Engineering for Kent Coast Electrification

*Engineering works between Shortlands and Sittingbourne and the Swale to improve operating of electric services*



*Under-bridge nearing completion to carry the up and down Bickley loops in their new position*

WHEN the extension of electrification in the Southern Region of British Railways was planned, the effects of electrification on the existing lines had to be seriously considered. Not only would there be a greatly increased service of trains to be imposed on suburban lines already carrying heavy traffic, but greater speeds were to be provided for. Between Bickley Junction and Swanley Junction, where the Maidstone trains part company from the Kent Coast line, there were only two tracks. Associated with the work was the introduction of colour-light signalling over the whole extent of the route from Brixton to Ramsgate.

There were also a number of severe permanent restrictions at such places as Shortlands Junction, the various loops and junctions at Bickley, and at Swanley Junction. Moreover between Shortlands and Bickley the existing four tracks were arranged as two down lines and two up lines. This meant, for instance, that an up Holborn train fouled both the up and down Victoria lines. To alleviate the difficulty, and provide for the additional trains, the running has been altered to two pairs of up and down lines as shown in diagram "A."

A comprehensive scheme was prepared for all the work between Shortlands and Swanley amounting to £2,612,000. A contract was let to George Wimpey & Co. Limited in June, 1957, for the design and construction of the works, and a start at the site was made in August of the same year. The target date for the completion of the contract was May, 1959. The Cleveland Bridge & Engineering Co. Ltd. were the main sub-con-

tractors for the design and construction of all the steel bridges, as well as being the main contractor for bridge 55 at Shortlands.

The first step, however, was to prepare an accurate survey over the whole of the route from Shortlands to Swanley. Because of the urgency a contract was let in 1956 to Meridian Airmaps Limited for an aerial survey to a scale of 1/1250. The aerial photographs forming the basis of the survey proved to be of considerable incidental value in successfully contesting opposition to the scheme during its progress through Parliament. The same firm also undertook the

monthly flight photographs of work in progress.

### Shortlands to Bickley

At Shortlands, in order to raise the existing speed restriction of 40 m.p.h. to 60 m.p.h. considerable curve improvements were required on the up side. This involved the widening and partial lengthening of bridge 55, making it 187 ft. 6 in. long. Because of the rising gradient of the Bromley Road on the side which was being widened, it was necessary to raise the track 18 in. to afford the requisite headroom under the bridge. This necessitated a corresponding raising of the platforms and of the junction.

On the Victoria side of the station, considerable earthworks were involved in forming a new bank and cutting to carry the tracks in their new alignment. The maximum inward slew to flatten the curve was 30 ft. Extensive alterations were necessary to the permanent way layout both here and at Bromley South where speed restrictions on the outer tracks have also been raised to 60 m.p.h.

At Bromley South the platforms have been lengthened to take 12-car trains, and interchange facilities provided with a new luggage bridge and lifts. The whole of the station buildings at street level and the platform buildings have been drastically altered and modernised. At Bickley, track re-alignment required the construction of a mass concrete retaining wall 140 yds. long and 22 ft. high. Improvements have also been incorporated into the station buildings.

### Bickley Junction Loops

There are four junctions in this locality, which comprises a number of burrowing

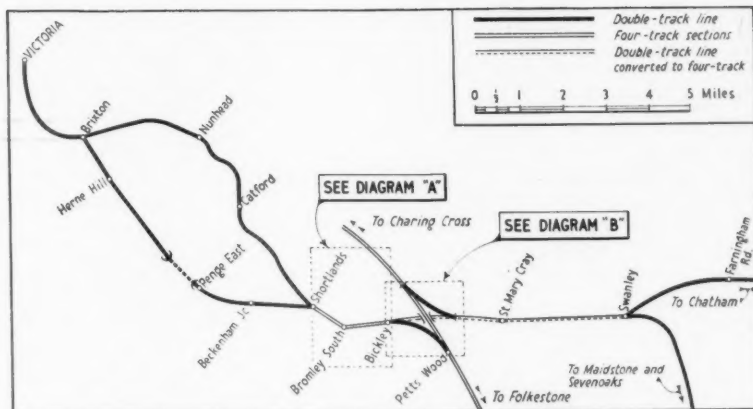


*Up Chislehurst loop and down Bickley loop junction in realigned positions*

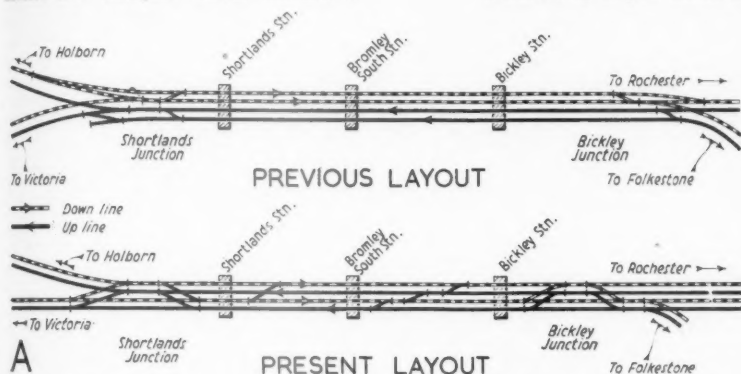


and flyover lines covering a large area. The original layout included a number of sharp curves carrying severe speed restrictions of 30 to 35 m.p.h. with 20 m.p.h. at the junction. Three of the main loops, two of which carry the main boat train traffic, have been re-located on new alignments so as to raise the speed to 50 m.p.h. as shown in diagram "B."

Heavy earthworks were entailed in forming the various cuttings and embankments. Extreme difficulty was experienced in handling the 180,000 cu. yd. of soil involved within the confined area of the loops. Moreover, a further 60,000 cu. yd. had to be stockpiled on the site to be available to fill in the abandoned cuttings after completing the new loop lines. To facilitate the passage of lorries and dumpers across the site a



Location of major works between Shortlands and Swanley



Previous and present layout of the Shortlands-Bickley section

110 ft. Bailey bridge was constructed over the up and down loop lines near bridge 155A. In addition three new steel under-bridges and a footbridge had to be constructed and four bridges partially reconstructed and extended.

Extensive permanent way alterations had to be undertaken with short possessions under a very carefully prepared programme. Each stage of the work had to be linked in with other track possessions, not only in the area, but further afield beyond Gillingham where the main extension of electrification works was in progress. Moreover, every effort was made to keep temporary speed restrictions to a minimum so as to avoid undue disturbance to the train service. Accordingly programme meetings were held at three-monthly intervals between the Operating, Engineering, and Signal Departments. Final arrangements were made weekly one month in advance.

In the Bickley loop area as well as at St. Mary Cray, blanketing with 2 ft. of stone dust had to be provided where the formation rested on clay. In all, some 49 pairs of new switches and 123 crossings were laid in. These included two pairs of the new fast running "G" type switches and cast manganese 1 in 24 crossings at Shortlands.

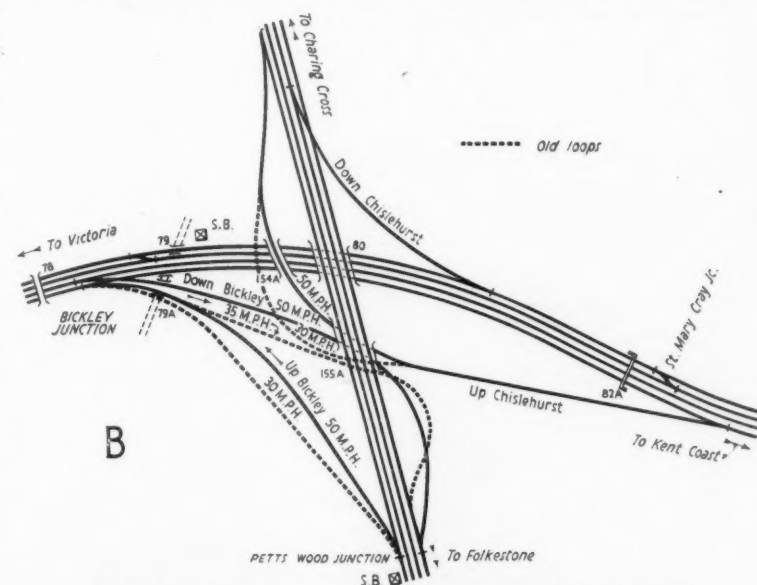
#### St. Mary Cray to Swanley

From Bickley Junction there were formerly only two tracks as far as Swanley, where there were four lines through

was not always feasible, and heavy concrete retaining walls nearly half-a-mile long were required. These were up to 23 ft. high on one side and 14 ft. 6 in. on the other.

St. Mary Cray Station consisted originally of two staggered platforms on either side of the line. The entire station had, therefore, to be reconstructed as two island platforms 900 ft. long with new station buildings at road level. This work was also undertaken by Geo. Wimpey & Co. Ltd. The old station was kept going while the work was in progress serving over 340 trains a day. The platforms are part covered with glazed canopies, while the new booking office and hall extends over all four tracks and platforms. The old goods yard stood in the way of the track widening, and had to be remodelled and equipped with coal pens and a concrete access roadway. A goods office, parcels buildings, and new garages were amongst the new features provided.

Beyond the station the remainder of the widening for the two additional



Realigned tracks between Bickley, Chislehurst, and St. Mary Cray



Bridge carrying Charing Cross-Folkestone line over the Kent Coast lines

tracks was constructed wholly on the up side. The first major work was a new nine-arch brick viaduct over the Cray river, canal, and a road. This structure alone absorbed over 500,000 bricks, some 3,500 cu. yd. of concrete and 100 tons of sheet piling. Considerable earthworks in bank and cutting formed the main work from there on to Swanley. Over the whole length from Shortlands to Swanley there were 473,000 cu. yd. of excavation and nearly 200,000 cu. yd. of filling. In addition there were 11 miles of drains, 80,000 cu. yd. of granite dust as blanketing and 35,000 cu. yd. of stone ballast.

On this last stretch of line two brick public road bridges were demolished by explosives and replaced with new steel superstructures. There is also a new retaining wall here, one of the 22 which had to be built, requiring 20,000 cu. yd.



Concrete retaining wall near Swanley to provide width for quadrupling



Original sub-station (left) adjoining the Charing Cross-Folkestone main line, and the new Chislehurst signalbox (right)

of concrete and using 15,000 sq. yd. of steel shuttering. In addition over 15,000 sq. yd. of steel sheet piles were used in the temporary works and for stabilising slips in the clay cuttings.

#### Rainham to Newington

Between Rainham and Newington up and down passing loops, 2½ miles long, have been constructed to enable stopping trains to be by-passed by fast trains. The work was designed to give an approximate balance of cut and fill. It involved excavation, transport, and consolidation of some 94,000 cu. yd. of material. As the main Dover Road runs parallel to the railway at a distance of less than a quarter of a mile from it, transport of spoil from cuttings and embankments was carried out in road vehicles making use of the points of access to the line afforded by two public roads passing over the railway, two passing under it, and three occupation roads.

The work necessitated the widening or complete reconstruction of eight bridges. At Newington Station the plat-

forms and footbridge were also demolished to yield space for the new loops. New platforms have been constructed in a set-back position at the London end of the station, and a new footbridge built for access to the down side.

#### Sheerness Branch Widening

The Sheerness Branch consisted of a single line seven miles long from Sittingbourne Middle Junction to Sheerness-on-Sea with passing places at Kemsley Halt and Queensborough and a private siding connection at Ridham Dock. Midway between Kemsley and Queensborough is the rolling lift bridge over the Swale, with the Swale Halt platform on the mainland side of it.

The single line at Middle Junction was approached by two short sections of double line from Sittingbourne Western and Eastern Junctions respectively. The provision of an additional section of double line was imperative to achieve the objective of three electric passenger trains an hour on the branch and to

maintain service to the private siding connection. Doubling was therefore decided upon for the length between Middle Junction and a point south of Swale Halt a distance of three miles.

With minor exceptions, there was land enough for a double line within the railway fences, but in the cutting north of Kemsley Halt the taking of additional land and dressing back of the slope was avoided by driving steel-sheet piling to form a retaining wall. Apart from this cutting earthworks were slight. Bridgework, too, was not heavy.

In the area of extension of electrification the work of installing conductor rails and their accessories was done by gangs recruited for the purpose and based principally at Faversham under the direct control of the Assistant Engineer (Modernisation). Similar gangs carried out the preparation of routes for high-voltage feeder cables and pilot cables together with most of the routes for colour-light signalling cables. The principal operations were carried out by this force, which at its maximum strength



One of the new island platforms at St. Mary Cray Station, showing new bridge giving access to the booking hall



Rainham-Newington widening after completion of earthworks

numbered over 300 men.

On the boat train route from Gillingham to Dover 150-lb. conductor rail was used and on other running lines 106-lb. rail. In some sidings second-hand conductor rail originally of 100-lb. section was used.

#### New Signalboxes

To cater for the changeover from mechanically operated semaphore to semi-automatic colour-light signalling eight new signalboxes and 28 relay rooms, all in brickwork, have been completed. As a result 31 old signalboxes have been displaced, and some 60 signal structures such as gantries and bridges have also been designed and erected.

The civil engineering work has been carried out under the general direction of Mr. A. H. Cantrell, Chief Civil Engineer of the Southern Region, and Mr. N. E. V. Viner-Brady, the New Works Engineer.

The principal sub-contractors are as follow :—

Civil engineering work between Shortlands and Swanley	George Wimpey & Co. Ltd.
Design and construction of steel bridges	Cleveland Bridge & Engineering Co. Ltd.
Aerial survey	Meridian Maps Limited
Widening between Rainham and Newington	John Laing & Son Ltd.
Earthworks, bridges and piling on the Sheerness branch	Taylor Woodrow Construction Limited
Construction of signalboxes	Demolition and Construction Co. Ltd. Taylor Woodrow Construction Limited



Sheet-steel retaining wall built to support cutting slope on the Sheerness Branch



## Electric Locomotives and Multiple-Unit Stock

*Southern Region 2,500-h.p. Bo-Bo locomotives, four-car express units, and two-car intermediate units*



*Four-car corridor unit for Kent Coast electric service*

THE whole of the Kent Coast electrification scheme will require 112 four-car express and 108 two-car intermediate electric multiple-unit sets as well as 24 electric and 98 diesel-electric locomotives. There will also be 10 electric motor luggage vans for attachment to multiple-unit boat trains. The requirements for phase I are 53 express units, 63 intermediate units, 13 electric locomotives, 45 diesel-electric locomotives, and two luggage vans, although the

diesel-electric locomotives are not strictly related to the electrification phasing.

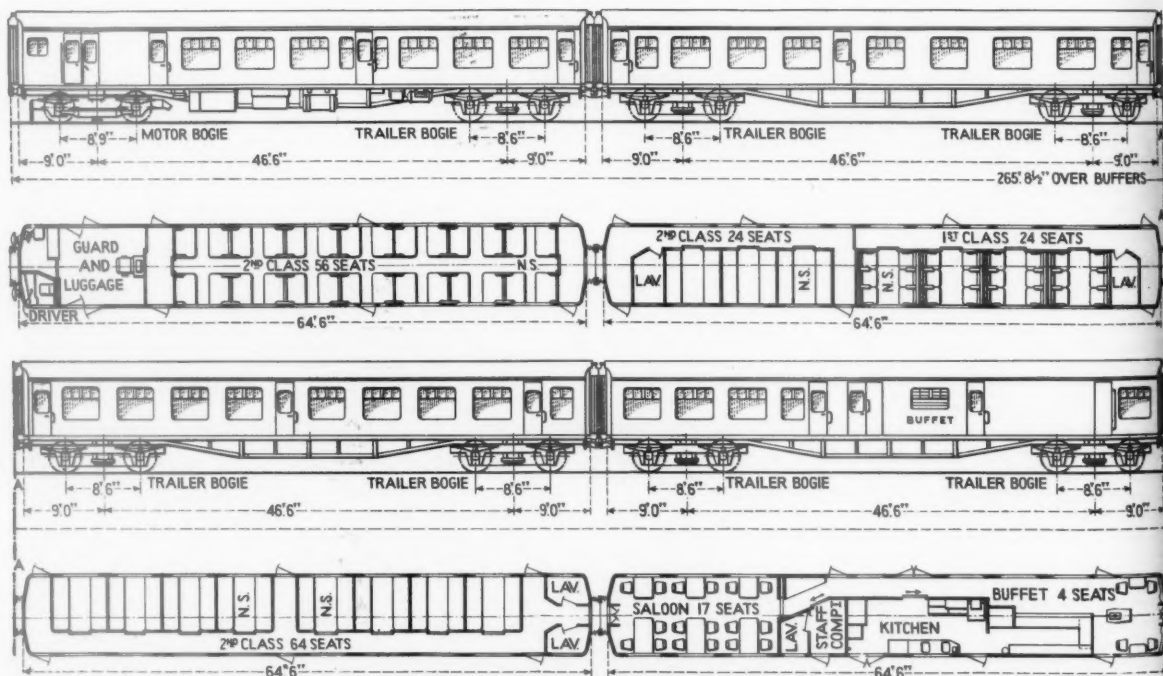
### Multiple-Unit Stock

The four-car express electric units are almost identical with the units completed in 1956, and all the features contributing to simple and flexible operation which have been well tried and found valuable on all the Southern Region stock built since 1951 are incorporated. These are as follow: All classes of stock

couple and inter-run in multiple unit trains. Preparation of the train for service is reduced to closing one switch on each motor coach and releasing hand-brakes. The driver needs only one small key to drive the train. The same applies to all Southern Region diesel and electric trains and locomotives, and the key is a personal issue to each driver. Inter-unit couplings are reduced to the minimum and grouped to make coupling and uncoupling quick and safe at platform level. Buck-eye automatic couplers are fitted with the same purpose and the trains run with them in the raised position, and with the side buffers retracted, ready for coupling to another unit.

The motors are also of the same power as those of the earlier units and give the same level balancing speed of 72 m.p.h. but the acceleration rate has been raised slightly, partly to ensure satisfactory performance on the 1 in 30 gradient of the Folkestone Harbour Branch which will be electrified in the second phase of the present scheme. Layout and general construction of the coaches, too, is much as in the earlier units but both electrically and mechanically there are several important changes.

An oil-air operated camshaft switch group replaces the electro-pneumatic unit switches of the control equipment of the older units, and both axle journal and motor suspension bearings are now of roller type. To minimise the risk of current passing through any of these



*Principal dimensions and layout of four-car express unit and buffet car. The buffet replaces the second compartment trailer. The other motor coach is identical to that illustrated*

bearings, the return side of both traction and auxiliary circuits is brought to insulated earth brushes bearing directly on the axles.

The traction motors are equipped with roller bearing motor suspension units supplied by British Timken Limited. These units consist essentially of a split cast steel housing incorporating two high capacity Timken tapered roller bearings. The two halves of the housing are secured by fitted taper bolts. This is the first application of split motor suspension units to main line multiple-unit stock.

#### Bogie Design

A number of other changes have been made to reduce wear and improve comfort. The bogies are identical with those of the Hastings diesel-electric units. They have been fitted with lateral shock absorbers, shear-type rubber auxiliary springs and rubber bonded spherical bearings for the bolster swing hangers. The gangway stems are now rubber mounted and the gangway face plates lined with anti-friction material to eliminate periodical lubrication which previously necessitated the separating of the coaches of units every month. These changes are also being made to the older express units.

Windows are double glazed, and heat and sound insulation has been installed for the body sides, ends, roofs and floors. The capacity of the heaters has also been increased. The unit consists of two motor second brakes, one corridor composite and one corridor second.

#### Passenger Accommodation

The layout of the passenger accommodation of the motor second brake consists of two saloons separated by a centre transverse glass panelled screen. There are vestibules at either end with access from both sides of the car, and

centre bodyside doors in one of the saloons on both sides of the car. The car seats 56 passengers and has a centre gangway running the length of the saloons.

The bodysides are finished in plastic panelling with windows framed with sycamore or ash. The bodyside panels below and between the windows are of plastic steel-blue matt finish with a narrow glossy black panel immediately below the window sill to take ash trays and table mountings. The panels above the windows and the ceilings are of light grey matt finish. The saloon ends and centre partition are finished in glossy white plastic.

The corridor second consists of eight second class compartments seating 64 passengers, with side corridor and twin lavatories at one end of the coach and with end and centre vestibules. The compartment bodysides are finished in sycamore or ash. The bodyside panels below the windows and either side of the windows are of red plastic matt finish, with a narrow glossy black panel immediately below the window sill. The ceiling is panelled in light grey matt finish plastic.

#### Corridor Composite Coach

The corridor composite vehicle consists of four first class compartments seating 24 passengers and three second class compartments seating 24 passengers with side corridor. There are lavatories and vestibules at either end and a centre vestibule with corridor dividing doors between the first and second class accommodation.

The bodysides are finished in plastic panelling, with windows framed in sycamore. The bodyside panel below the window and either side of the window is in green plastic matt finish, with a narrow glossy black panel

immediately below the window sill. The ceiling is panelled in light grey matt finish plastic and the partition above the seat back in walnut veneered panelling. The corridor partition is panelled in dove grey plastic, with a glossy white plastic panel above the door-head. The corridor and vestibule at the first class end of the car are finished in plastic throughout, the bodyside and ceilings being panelled in light grey matt and the corridor partition in dove grey.

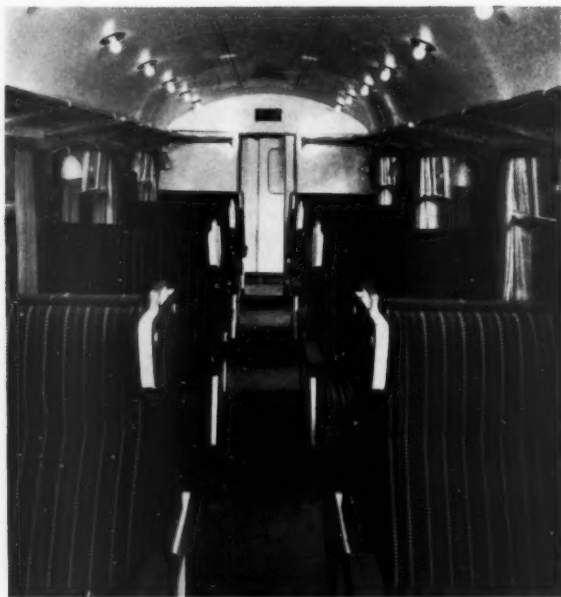
#### Buffet Cars

Ten of the 53 units have buffet cars in place of the second class compartment trailer cars. The buffet cars in these units are of steel construction to the British Railways steam stock 9 ft. profile, and their general layout and equipment is much as in those of the earlier units and the Hastings diesel-electric units.

The layout of the vehicle is in three main parts, the dining saloon at one end, kitchen and staff quarters in the middle, and the bar and buffet at the other end of the car. A corridor with a service counter from the kitchen connects the saloon and buffet ends.

The dining saloon seats 17 passengers, and is finished in plastic panelling framed with sycamore. The bodyside panels from the floor to ceiling are of plastic greywood, and the ceiling panels of matt white finish. The saloon end and draught screens at the gangway doorway entrance are finished in stardust brown. The saloon transverse partition at the kitchen end is finished in glossy white plastic, and the table tops are covered with blue-grey check plastic.

The kitchen, which has steel framed walls, with aluminium panels and cavities insulated with fibreglass, is equipped with an electric cooker, with



First class compartment in composite coach (left) and second class open saloon (right)



*Interior of buffet coach, showing self-service counter*

grill and hot closet, a refrigerator, and ice-cream conservator. The sink unit is of stainless steel, with an electrically heated sterilising unit. Communication is provided between the kitchen and buffet to facilitate service, and the coffee machine has been housed between the two for convenience. There is a bottle cooler under the end of the counter in the buffet, remote from the kitchen, and extractor fans are fitted in the roof over the kitchen and also over the coffee machine. The interior decor of the buffet end is generally similar to that of the dining saloon.

#### Two-Car Units

The two-car units for the intermediate services consist of a semi-saloon second class brake motor coach and a composite driving trailer with lavatories for both classes. There is no corridor connection between coaches. Construction is similar to the express units but without double-glazed windows. The motor luggage vans are similar both mechanically and electrically to the multiple-unit coaches with the addition of a traction battery to allow them to work for a limited period over quayside lines which cannot be electrified.

#### Electric Locomotives

The 2,500-h.p. Bo-Bo electric locomotives are required to handle freight trains of up to 900 tons over the heavily graded routes of the South-Eastern Division of the Region. They will also operate, to express schedules, fully fitted

trains of 30 or more Continental train ferry vehicles, and passenger trains, including the "Night Ferry" which may load up to as much as 700 tons. These duties demand a locomotive with good adhesion characteristics, a large number of running notches, and a fairly wide range of traction motor field weakening.

The body design is to the requirements of the British Transport Commission Design Panel in association with the Design Research Unit. The lines are intentionally unelaborate and the curved body sides conform with the British Railways standard carriage stock.

The bodywork is not intended to take

any main stresses and is therefore of comparatively light and simple construction. It consists of a central equipment compartment, 38 ft. 2 in. long between partitions, with a driving cab at each end. There are no direct external doors to the cabs and access is gained through a door in the partition.

The generator of the large-capacity single-booster motor-generator set is connected in series between two parallel pairs of traction motors wound for full line volts. The output of this machine is 945 kW. at 1,750 r.p.m. and the motor of the set has a continuous rating of 1,360 h.p. at 675 V. The armatures of both machines are identical and interchangeable although the frames and field systems are necessarily different.

The set actually consists of three machines forming a group carried on four heavy mounting feet. The frames of the motor and generator are bolted to a central housing surrounding a gear-type coupling, while the outer end plate of the generator carries an overhung auxiliary generator for control supplies and battery charging. A mechanical overspeed trip ensures protection from damage due to overspeed occurring under fault conditions.

The motor and generator armature shafts each carry a heavy flywheel to provide kinetic energy to help maintain the speed of the set during normal supply interruptions. Each flywheel has a powerful electro-pneumatically operated rim brake which can be used to stop the set quickly.

The four E.E.532/A type traction motors are six-pole machines with a 1-hr. rating of 638 h.p. at 675 V. They are fully bogie suspended and drive the axles through Brown-Boveri spring drives, similar to those used on the Swiss Federal Railways in the Re 4/4 and Ae 6/6 type locomotives. The gears and pinions are case-hardened and ground, the teeth have a helix angle of  $8\frac{1}{2}$  deg., and the gear ratio is 22 : 76 giving a maximum safe speed of 90 m.p.h.

#### Fabricated Underframe

The underframe is a fabricated structure consisting essentially of two longitudinal members, spaced closely together



*Southern Region 2,500-h.p. electric locomotive built at British Railways workshops, Doncaster*



## Electric Traction Section

on either side of the locomotive centre line, two dragbox assemblies, and two cross members at the bogie centre lines. Each longitudinal is built up of three sections of rolled steel joists: the end sections over the bogies are 6 in. wide by 12 in. deep while over the centre section the depth is increased to 16 in. The middle portion of the main members is strengthened by top and bottom plates, and the whole structure is stiffened by cross members and is pre-cambered.

The bogie frame is a welded structure of box section throughout, built up of flat plate and pressings. The side members, centre transomes and headstocks are fabricated as one homogeneous structure. The base is formed of  $\frac{1}{2}$ -in. thick plate and the sides and top in the form of an inverted "U" are made in  $\frac{1}{2}$ -in. and  $\frac{1}{8}$ -in. thick plates. Ordinary structural quality mild steel is used for ease of welding. Bosses are fitted in the side members for the reception of the circular axlebox guide pillars which are pressed in with a force of 20-30 tons. Integral brackets support the traction motors, brake cylinders, and other fittings.

The complete bogie frame fabrications have been stress relieved before machining to prevent subsequent distortion, following the machining of the bogies. The design of the axlebox guides, axleboxes, and primary suspension, was carried out in association with the Swiss Locomotive & Machine Works, Winterthur, and manufactured in the United Kingdom under licence.

The bogies carry the weight of the main underframe on spherically seated pads resting on the bolsters. These pads have both spherical and flat surfaces lined with non-metallic friction materials. The flat surfaces are arranged to slide when the bogie rotates and any tendency of the bogies to "hunt" is resisted by the friction linings.

Of the 13 locomotives built initially seven are fitted with axleboxes having Timken tapered roller bearings while the remainder have S.K.F. self-aligning roller bearings. The axlebox carcasses are steel castings and incorporate, on either side, extensions to form seatings for the helical bearing springs and concentric guide bushes. Each axlebox has integral brackets to carry a teak shoe

beam which supports, at its centre, a collector specially designed for the limited space available. The axleboxes also incorporate housings for the insulated earth return brushes, which bear on copper rings spigotted into the outer faces of the wheel bosses. The axleboxes themselves are insulated from the frame, thus ensuring that no current can be conveyed through the roller bearings.

## Compressed-air Braking

The locomotives are fitted with compressed-air brake equipment and the system is one in which the vacuum brake, when in use on the train being hauled, is compressed-air controlled. Provision has been made for the haulage of Continental stock using an air brake on the train, and this feature also enables dead multiple-unit stock to be hauled, should this be necessary. Provision is made in the layout of the cab for the installation at a later date of British Railways standard A.T.C. equipment.

The main characteristics are as follow:—

Weight in working order	77 tons
Radius of minimum curve	4 ch.
Nominal supply voltage	675 V. d.c.
Maximum service speed	90 m.p.h.
Gear ratio	76:22
Traction motor voltage	675 V.
1 hr. rating of motors	638 h.p.
1 hr. rating of locomotive	2,552 h.p.
Tractive effort nominal max.	43,000 lb. at 25 per cent. adhesion
Tractive effort, 1 hr.	20,000 lb. at 47 m.p.h.
Control voltage	110 V.
Control air pressure	70 lb. per sq. in.
Generator rating (continuous)	945 kW, 1,400 A., 675 V.
Cooling air	6,500 cu. ft. per min.
Auxiliary generator EE.910/B	9.2 kW., 83.5 A., 110 V.

The multiple-unit stock was built at Eastleigh Works, British Railways, Southern Region, under the general direction of Mr. W. J. A. Sykes, Chief Mechanical & Electrical Engineer; Mr. H. S. Smyth, Electrical Engineer; and Mr. F. J. Pepper, Carriage & Wagon Engineer.

The principal sub-contractors are as follow:—

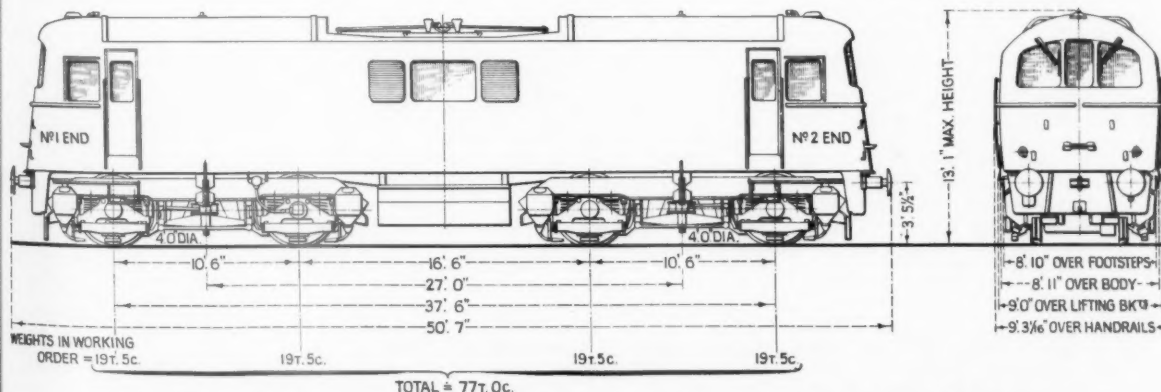
Electric traction equipment	English Electric Co. Ltd.
Electro-pneumatic brakes	Westinghouse Brake & Signal Co. Ltd.
Axleboxes (roller bearing)	The Hoffmann Manufacturing Co. Ltd.
	Taylor Bros. & Co. Ltd.
	Owen & Dyson Limited
Wheels and axles	J. Baker & Bessemer Limited

Bolster springs	English Steel Spring Corporation Limited
	Turton Bros. & Matthews Limited
Vestibule suspension	George Spencer, Moulton & Co. Ltd.
	Andre Rubber Co. Ltd.
	Laycock Engineering Limited
Drophead couplers	A. G. Wild & Co. Ltd.
Solid shank couplers	English Steel Castings Corporation Limited
Buffing and drawgear (springs)	George Spencer, Moulton & Co. Ltd.
Shock absorbers	Woodhead Monroe Limited
Auxiliary bearing springs	B.T.R. Industries Limited
Anti-friction materials	J. W. Roberts Limited
	British Belting & Asbestos Limited
Route indicators	Transport Engineering & Equipment Limited
Window wipers	Trico-Folberth Limited
Windows	Beckett, Laycock & Watkinson Limited
Interior panels	Formica Limited
	Wareite Limited
Bodyside passenger doors	Lightalloys Limited
Self-closing gear for double doors	G. D. Peters Limited
Ventilation fans	Vent Axia Limited

The locomotive design was carried out under the direction of Mr. W. J. A. Sykes, Chief Mechanical & Electrical Engineer, Southern Region, in consultation with Mr. R. C. Bond, who was the Chief Mechanical Engineer, British Railways Central Staff, at the time the design was prepared, and Mr. S. B. Warder, Chief Electrical Engineer, British Railways Central Staff, British Transport Commission. The design of the mechanical portions of the locomotive was prepared in the locomotive drawing office at Brighton, while the original conception of the locomotive and the supervision of the design of its power equipment were by the electrical engineering staff at London Bridge.

The principal sub-contractors are as follow:—

Electrical equipment	English Electric Co. Ltd.
Buffers	Oleo Pneumatics Limited
Rubber bushes	Metastatik Limited
Blower fan	Silentbloc Limited
	Aerex Limited
Brake equipment	Davies & Metcalfe Limited
	Westinghouse Brake & Signal Co. Ltd.
Flexible connections for air ducts	Rediwell Limited
Draw springs	Spencer, Moulton & Co. Ltd.
Helical bearing springs	Samuel Fox & Co. Ltd.
Rubber springs	Andre Rubber Co. Ltd.
Traction motor bellows	Huntingdon Rubber Co. Ltd.
Battery	Nife Batteries Limited
Oscillation dampers	Jonas Woodhead & Sons Ltd.
Speedometer	Smiths Industrial Instruments Limited
Fire extinguishers	Pyrene Co. Ltd.
Friction pads	British Belting & Asbestos Co. Ltd.
Blower for cab ventilation	J. W. Roberts Limited
	General Electric Co. Ltd.



Side and front elevation of the 2,500-h.p. Bo-Bo electric locomotive, showing main dimensions

## Planning and Operating the Kent Coast Electric Services

*Formation of electrification committee to co-ordinate the developments for the Kent Coast electrification*

**B**ECAUSE of the magnitude of the electrification schemes and the many complications arising in connection with them, Mr. C. P. Hopkins, the General Manager of the Southern Region, set up an Electrification Committee in June, 1955, under the Chairmanship of Mr. S. A. Fitch, composed of the departmental officers concerned, together with an officer of the B.T.C. to review progress and to resolve difficulties as they arise, this committee to be assisted in its work by a sub-committee of representatives under the chairmanship of Mr. R. E. Coward, Assistant Engineer (Modernisation).

The Committee was charged to report, through its minutes, to the General Manager to enable him to be aware at an early stage of matters requiring policy decision so that these points could be dealt with quickly.

### Implementation of Scheme

By means of this set-up the stage 1 proposals were sufficiently developed for submission for approval in principle to be made to the B.T.C. in January, 1956, this being given in February of that year, and from that time the actual implementation of the scheme has gone forward and its progress has been steered by these committees with the result that Phase 1 is now being brought into service on the target date set by the electrification committee as long ago as 1955.

At the same time the electrification committee has been co-ordinating the developments for Phase 2 of this stage of electrification extensions and has been initiating and encouraging the planning work involved for the future stages of electrification extensions in the Southern Region.

### Kent Coast Services

The outstanding feature of the Southern Region summer timetable, in operation from June 15, is the revolutionary improvement in the Kent Coast service, resulting from Phase 1 of the electrification. Compared with the present steam service, during the off-peak hours the times of the hourly expresses from Victoria will be cut by an average of 31 min. to Herne Bay, 36 min. to Margate, and 42 min. to Ramsgate. Acceleration on such a scale has seldom been effected in one single timetable change. With the morning and evening business trains, which are already fairly fast, the cuts in time are not quite as great; even so, an average reduction of 15 min. between Cannon Street and Herne Bay, 18 min. to and from Margate, and 23 min. to and from Ramsgate is substantial.

### Even-Interval Service

The service is on an even-interval basis. Hourly from 7.40 a.m. to 10.40 p.m. an express will leave Victoria, calling at Bromley South and Chatham (44 min.) to Gillingham, where it will divide. The

fast portion will continue non-stop to Whitstable (75 min.) and Herne Bay (81 min.), calling thereafter at all stations to Margate (100 min.) and Ramsgate (114 min.). Each hourly train thus will be faster than the quickest of the business trains to-day (the 5.14 p.m. from Cannon Street, taking 101 min. to Margate and 120 min. to Ramsgate). The second part of each express will proceed to Sittingbourne, Faversham, Canterbury East (88 min.), and stations to Dover Priory (114 min. from Victoria). These hourly services will be faster to Dover than all but five of the steam-hauled trains by the shorter route via Ashford.

### Trains from Charing Cross

Also at 40 min. past each hour trains will leave Charing Cross for Woolwich, Dartford, Gravesend, Strood, Rochester, Chatham and all stations to Ramsgate. With the London expresses these will provide a half-hourly service between Herne Bay, Margate and Ramsgate, and a direct service between Gravesend line stations and the Kent Coast. Connecting with these at Faversham will be hourly all-stations trains from Sheerness to Sittingbourne, Canterbury East, and Dover, which will both give an hourly service from Sheerness to the Kent Coast and also help with the second sections of the London expresses to provide a half-hourly stopping service between Faversham, Canterbury and Dover. In addition, the existing hourly stopping trains from Victoria at 16 min. past the hour, will start one min. earlier and be extended from Gillingham to Sheerness, and the second portions of the expresses from Victoria at 40 min. past the hour will have Sheerness connections from Sittingbourne so that Sheerness also will have a half-hourly service from London.

The fastest train of the day will be the 5.14 p.m. from Cannon Street, calling as now only at Whitstable (65 min.), Herne Bay (72 min.), and stations from Margate (86 min.) to Ramsgate (99 min.), so for the first time on record providing a daily time of less than 1½ hr. from Cannon Street to Margate.

### Relief Trains

On summer Saturday mornings and afternoons there will be a succession of nine relief trains to the 40 min. past the hr. expresses from Victoria, with first stop at Herne Bay, two taking 87 min. to Margate, one 88 min., three 90 min. and three 94 min.; in previous years almost all these reliefs have taken just over 2 hr. to reach Margate. A particular benefit will be the late evening expresses from Victoria at 10.40 and 11.30 p.m. to Herne Bay, Margate, and Ramsgate; at present the last down service is at 9.35 p.m. Buffet cars will run daily in most of the expresses at 40 min. past the hour from Victoria,

and the 4.44, 5.14, and 5.44 p.m. from Cannon Street. The up service will follow the same pattern, with the hourly expresses leaving Ramsgate at 10 min. past each hour from 9.10 a.m. to 10.10 p.m., and the connecting Dover services also at 10 min. past; the journey times will be 115 min. from Ramsgate and Dover, 102 min. from Margate, 84 min. from Herne Bay and 45 min. from Chatham to Victoria. The whole Kent Coast timetable is an imaginative and well-planned piece of work.

### Operation of Boat Trains

"The Night Ferry" through sleeping car service between London, Paris and Brussels via Dover-Dunkerque will be hauled in each direction between Victoria and Dover Marine via Chatham by one of the new 2,500-h.p. electric locomotives which are capable of hauling loads up to 750 ton in schedules of a little under 100 min.

Other employment for these locomotives will include the 3 a.m. Holborn Viaduct to Ramsgate passenger and newspaper train, also certain van, G.V. ferry wagon and heavy main line freight trains varying in load from 700 to 1,000 ton with appropriate braked heads.

Other principal Continental boat trains between Victoria and Dover Marine will remain steam hauled until the second phase of the scheme, via Tonbridge, is operative. Reliefs to these trains will, however, in many cases be routed via Chatham and formed of express multiple-unit 12-car trains.

### Motor Luggage Vans

One of the problems associated with multiple unit operation is the need to furnish customs sealed vans for registered baggage and mails between London and the shipside. To meet this requirement electric motor luggage vans will be available capable of running on the electrified line either singly or with a limited trailing load or attached to a multiple-unit train and also equipped with sufficient battery power to be self-propelled on non-electrified lines between stations and sidings or the quayside.

When all Channel port routes are electrified the situation will permit the general adoption of electric multiple-unit plus motor luggage van operation for regular as well as relief Continental boat train services.

**Wild-Barfield Furnaces to be Exhibited in Paris.**—At the Ve Salon de la Chimie, to be held in Paris on June 16-30, equipment by Wild-Barfield Electric Furnaces Limited, will include a variety of laboratory muffles, a laboratory resistance-heated vacuum furnace, and a vacuum fusion gas analyser Model 912. This last item will be demonstrated by an illuminated diagram which will illustrate the stages of analysing samples of steel and so on, to determine the content of hydrogen, oxygen and nitrogen.

## Colour-Light Signalling

*Multi-aspect colour lights from London to Ramsgate with power signal boxes at eight stations and remote control on the Sheerness branch*



New signalbox at Chislehurst Junction

To enable the new services to operate to the maximum advantage it was necessary to re-signal the entire route from Factory Junction, a short distance out of Victoria—where the colour-light signalling installed in 1939 terminated—to Ramsgate via both the main Herne Hill line and the Catford Loop, about 97 route miles.

Concentration of control in fewer signalboxes would bring appreciable savings while the use throughout of multiple-aspect colour-lights would greatly facilitate the task of the motormen and enable fog signalmen to be dispensed with. The signal aspects are those standard in the Region for this class of work using multi-lens running signals and floodlit disc shunts and subsidiaries. The control circuits follow well tried practice, as seen already on other elec-

trified routes. Where the new work connects with lines not affected by the present programme the usual approach light aspects are provided. In some cases they will remain only until the next stage in the electrification, through Tonbridge to Dover, is completed, for which additional re-signalling will be undertaken. While the extensive civil engineering works were being carried out many temporary modifications to the existing signalling were required. A short account of the first sections of the new signalling, brought into use on March 8, and 22, 1959, was given in our issue for April 3. The order in which these and successive changes have been effected is shown on the accompanying diagram. Although the track circuiting is in operation throughout, the colour-light signals between Westgate

and Ramsgate remain to be brought into service in July.

### Power Signalboxes

Relays and certain other items are largely of the plug-in type and in some cases of a smaller pattern than customary hitherto. At Shepherds Lane (Brixton) the new box contains a power lever frame and replaces not only the mechanical box which worked the facing connection to the up slow line but also the Brixton Junction and Canterbury Road Junction boxes. The last-named controlled the junction between the spur line to Loughborough Junction, over which considerable goods traffic is operated through Holborn to the L.T.E. Metropolitan widened lines and thence to the main lines north of London, and the Catford Loop line; this rejoins the main line via Herne Hill at Shortlands and at Nunhead has a connection to Lewisham and Hither Green sidings over which again numerous goods trains run. At Beckenham Junction a panel type relay interlocking box has been built, controlling the junctions with the lines to New Beckenham and Crystal Palace. This is of the push-button route setting type and incorporates for the first time the new design of plug-in relay of reduced dimensions, enabling the apparatus to be arranged very compactly in the relay room.

For operating reasons it was decided to have another box of like pattern at the next station, Shortlands, to replace the existing boxes there and at Bromley South, and control the junction between the Catford Loop and the main line together with the connections forming the commencement of the four-track section now extending all the way to Swanley. On its original portion from Shortlands to just beyond Bickley Station the former "parallel" working has been changed to "alternate," up and down. There are now double crossovers at

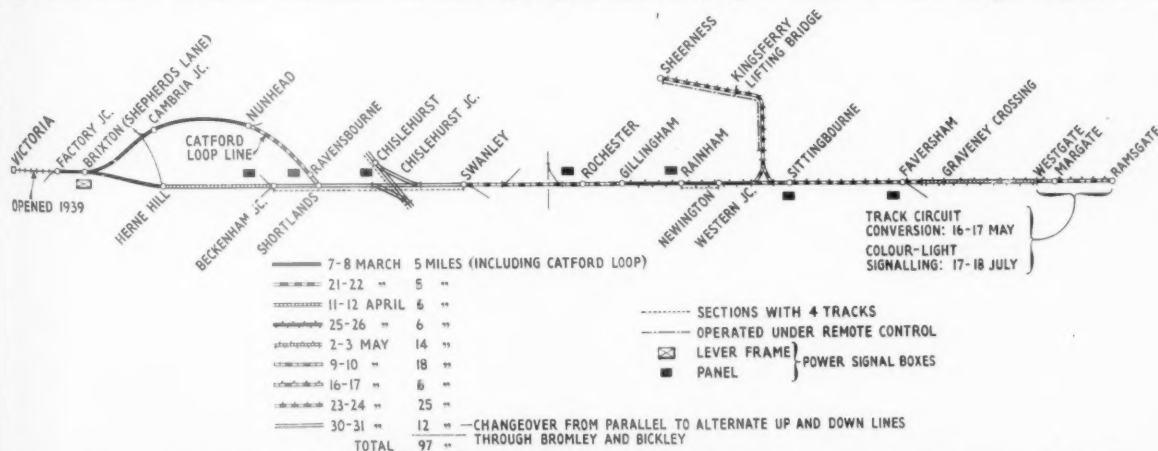
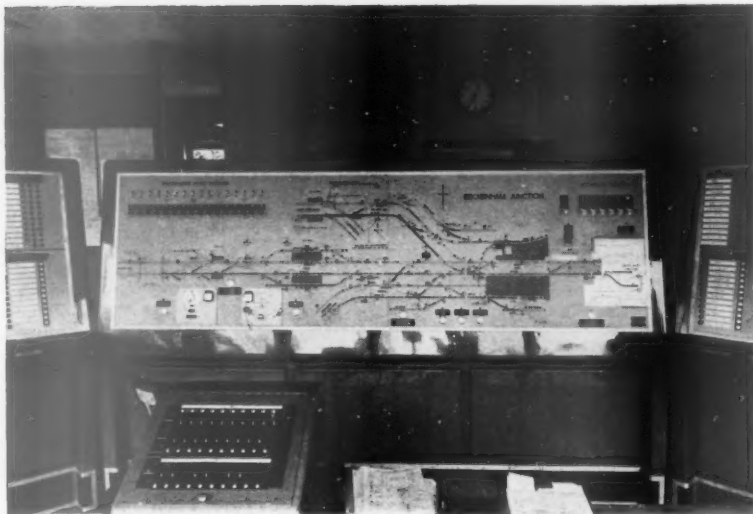


Diagram showing the extent of the new signalling installed in connection with the Kent Coast electrification and the dates on which the various sections were brought into use





*Route setting panel in Beckenham Junction Signalbox*

Shortlands with a single one between the down lines south of the station and three more south of Bromley, providing very complete intercommunication between fast and slow lines. Beyond Bickley there are again duplicate double cross-overs, after which the connection to Orpington diverges from the fast lines.

A large panel signalbox of the one control switch type, Chislehurst Junction, has replaced no fewer than seven others, namely old Chislehurst Junction and Goods boxes and Petts Wood Junction, on the Charing Cross-Tonbridge line; also Bickley Station and Junction, and St. Mary Cray Junction and Station boxes on the Chatham line. The extensive layout involved is illustrated on the accompanying folding plate and the signalling thereon depicted may be taken as typical of the practice followed throughout the whole of this new work. The former Orpington and Chislehurst Loops, repositioned to allow faster running, have been renamed the Tonbridge and Chatham Loops respectively. Traffic on all these lines is very heavy and the new box is one of the busiest in the Region. At present the new signalling connects with the existing semaphore equipment at Grove Park and Orpington, on the Tonbridge line, pending re-signalling in connection with electrification below Sevenoaks.

At Farningham Road a small panel has been installed at one end of the mechanical lever frame for power operation of the points at the old Fawkham Junction where the Gravesend West branch, now converted to a single line worked by electric key token instruments, leaves the Chatham main line.

The next full power box is at Rochester, replacing the mechanical ones at Chatham Goods Sidings and Chatham Station, which has now a plain double line layout without platform loops. This box operates on the entrance-exit principle and controls the loops and siding connections, etc., not coming under Strood Junction or Gillingham "A" boxes. At the latter place both the existing

mechanical boxes have been retained with appropriate modifications. The "B" box continues to control a level crossing and the connection to the Dockyard line over which traffic is worked by telephone block. Between here and Rainham there are three more level crossings, one of which formerly was a block post, where those in charge can place to danger when required the otherwise automatic signals on each side, with control by track circuiting over operation of the gates. It is impossible at present to eliminate these crossings, or certain others hereinafter referred to.

#### Operation of Crossing Gates

At Rainham Station, where there is another crossing and shortly beyond which the newly quadrupled section to Newington commences, there is also a panel type signalbox, equipped to operate the crossing gates hydraulically by oil at 250 lb. per sq. in. To move them a

key on the panel is actuated, after which depressing a push-button sets the mechanism in motion; this normally is held depressed until the operation is complete but the gates can be stopped or reversed at any point in the stroke. In an emergency, manual operation can be resorted to. The four tracks become two again immediately beyond Newington Station and just west of Sittingbourne is the triangular group of junctions, known as Western, Middle, and Eastern, forming the connection to the Sheerness branch, now also electrified. These junctions and the station itself are controlled from a new box, using entrance-exit route setting, built next to the old "B" box and replacing that and three others by ordinary power interlocking controls. In addition the box operates by remote control the whole of the Sheerness branch from Kemsley Halt, with field locations of apparatus there, at Swale Halt, Queenborough and Sheerness, at each of which there is a local relay interlocking panel which can be used in emergency as an individual signalbox but which normally is under the control of keys on the panel at Sittingbourne. (This branch has been doubled to a point beyond Ridham's siding, north of Kemsley Halt but remains single thereafter.) Return indications from all signalling functions along the branch, signals, points, track circuits, and so on, are transmitted back from the four interlocking locations and displayed on the main control panel.

#### Remote Control Equipment

The type of remote control used for the Sheerness branch is known as the "Edict" system (electronic digital indicating and control transmission); this uses the time division multiplex scanning principle with a 3.84 sec. cycle time, with cold cathode tubes as the basic switching element. The circuits of these are arranged to step through 160 positions in each cycle, during which all functions

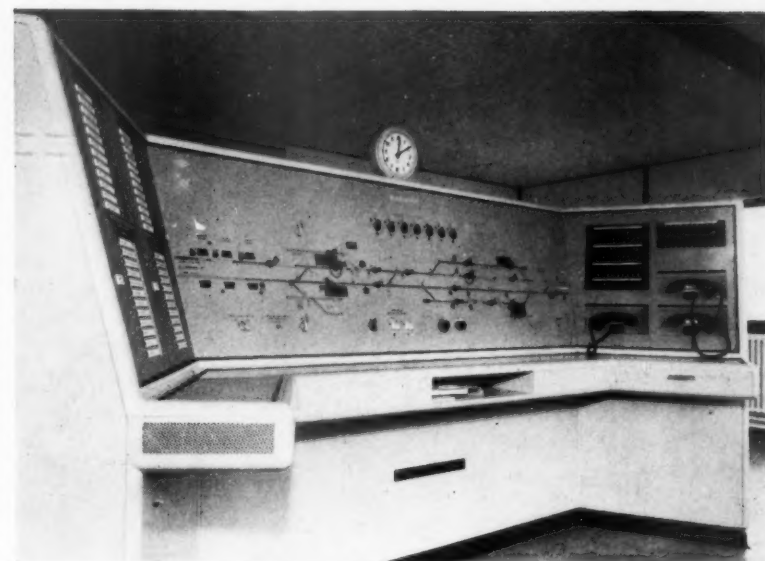


*Rainham Signalbox, showing crossing gates which are operated from the box*

whose condition requires to be transmitted from or back to Sittingbourne, are inspected in turn by the scanning circuits. These in turn control five voice frequency telegraph channels, in accordance with the information to be transmitted at each step, which employ transistor circuits throughout. One channel serves to drive the cold cathode units at the lineside locations in synchronism with the apparatus at the controlling signalbox, with two for each direction to carry the controls and indications, using two wires only. The Sheerness branch includes a lifting bridge over the Swale channel, separating Sheppey from the mainland, and control over its operation, with appropriate signal and other interlocking, has been incorporated in the new arrangements. The work at and near Sittingbourne is typical of the possibilities offered by the latest developments in signal engineering in the direction of increased efficiency combined with a reduction in operating costs.

At Teynham Station there are two level crossings, with three more between there and Faversham Station, where there is a route relay signalbox working on the "NX" entrance-exit system replacing the mechanical boxes at each end of the station. (The goods yard box remains in service.) This new box controls the whole station area and the junction between the Ramsgate and Dover lines. The latter is not involved in the present re-signalling scheme.

There are thus eight power signalboxes in all, at Shepherds Lane (Brixton), Beckenham Junction, Shortlands, Chislehurst Junction, Rochester, Rainham, Sittingbourne and Faversham, with the remote control equipment on the Sheerness branch and the mixed arrangement with some power points at Farningham Road. At the other stations and intermediate locations the old boxes have been either abolished; modified by the addi-



*Operating panel in Rainham Signalbox*

tion of illuminated diagrams, lever locks, circuit controllers and so on to exercise control over the new signals and operate points when required; or reduced to the standing of ground frames. There are 23 boxes modified to continue working as such but not all require to be manned continuously. The most important are those at Swanley, Gillingham, Margate and Ramsgate, with Strood Junction, on the North Kent line, remaining in control of the junction points in the Chatham main line just west of Rochester. Relay rooms have been added at these locations with a few separate ones at certain points along the route.

In some cases, as already mentioned, the retained boxes operate level crossing gates alongside stations, while the small boxes at six of the intermediate crossings,

some of which were block posts, now function as gate boxes. At the remaining one at Graveney, near Faversham, the box is still required to control a siding as well as the gates. Special releasing arrangements have been provided here to enable them to be opened for road traffic when the box is switched out at night.

#### Removal of Sidings

The lengthening of platforms at numerous places to accommodate the new trains has necessitated the removal of many siding and other connections. These have either been abolished or repositioned, often with ground frame control. In this way simple but satisfactory new layouts have been obtained at minimum cost. Electrical releases and telephonic communication with the controlling signalbox are provided in every case. Running signals have been located to give the facilities needed to operate the new accelerated services efficiently with adequate protection of shunting or other movements requiring to be made in a station. They provide for a 2½ min. headway between London and Swanley for stopping trains, with a 3 min. one through the Medway towns and between Margate and Ramsgate, and generally elsewhere a 3 min. headway for non-stopping trains. Junction indicators are provided where required and when there is a calling-on signal under the main signal they operate with both, if circumstances necessitate it. There are also some "theatre" type route indicators as for example at Ramsgate Station and one or two other places.

Colour-light signalling has been in use for some years on the long incline between Sole Street and Rochester and the Cuxton Road signalbox, normally closed and operating an emergency crossover, has been retained. In most cases the distances between stations are divided by automatic signals, while at many places the signals for the running



*Relay apparatus room in Rochester Signalbox*



*New signalbox at Shepherds Lane*

lines can be rendered automatic by reversing "king" levers. For example, it is possible to close all signalboxes between Swanley and Strood Junction, nearly 16 miles, and the track circuit indications are carried through in each direction to cover the entire length.

Telephones at practically all signals enable train men to communicate with the nearest open signalbox in advance and obtain instructions in emergencies. The circuits are so arranged that the signalman can tell from which signal a call originates, which greatly reduces the risk of misunderstanding, occasionally experienced with omnibus type circuits.

#### Train Describers

A complete magazine train describer system has been installed, using transmitters and receivers, and intermediate receivers at any location where they can prove useful in controlling the traffic. Such working already was in force as far as Factory Junction. The normal describing points on the main line from and including Herne Hill are Beckenham Junction, Shortlands, Chislehurst Junction, Swanley, Strood Junction, Rochester, Gillingham, Rainham, Sittingbourne, Faversham, Westgate, Margate and Ramsgate. In addition, in accordance with Southern Region practice, single stroke bell communication is provided between the various boxes, including those not equipped with describers, for special or emergency working.

Track circuiting is of the 50 cycle a.c. condenser fed type, using both rails for traction with auto-impedance bonds, except through points and crossings where single-rail circuits are used. Traction cross bonding using additional resonated bonds where necessary, is installed at regular intervals. The Region's standard proving of the "HR" signal relays in the track circuit feed also is provided.

#### Power Supplies

Power is taken from the Chief Mechanical & Electrical Engineer's Department and, in the newly-electrified area, entirely from the substations at 415V, 50 cycles single-phase a.c., but where electrification already existed at both that voltage and 440V. In the inner London area, however, power is taken from a ring main at 220V, 75 cycles. Transformers are installed as required at individual locations with trickle-charged accumulators at the signalboxes to give 24V, and 50V, d.c. for local circuits, train describers and telephones, and 120V, for point operation. There is no stand-by equipment belonging to the Signal Engineer's Department.

The whole of the work was planned and begun to the requirements of the then Signal Engineer of the Southern

Region, Mr. L. J. Boucher, and has been carried to completion under his successor Mr. J. F. H. Tyler, under the immediate supervision of Mr. C. F. Challis, New Works Assistant.

The supply and installation of equipment was divided among three main contractors, as follows:—

Herne Hill and Nunhead to Swanley, inclusive	Westinghouse Brake Signal Co. Ltd.
Outside Swanley Station to near Teynham Station and the Sheerness branch	Siemens & General Electric Railway Signal Co. Ltd.
Teynham Station, inclusive to Ramsgate	Metropolitan-Vickers G.R.S. Limited

The work at Shepherds Lane, and on the lines controlled from that box and on part of the Catford Loop was carried out by the Signal Engineer's staff using material supplied by the Westinghouse Brake & Signal Co. Ltd.

The principal sub-contractors are as follows:—

Signalling and telecommunications cables	W. T. Henleys Cables Limited
Signal posts ...	Siemens Edison Swan Limited
Signal structures ...	Tubewrights Limited
Point operating batteries	Sanders & Foster Limited
Signalboxes, relay rooms, and controller rooms	The Nife Battery Company
Telecommunications equipment	Taylor Woodrow & Co. Ltd.
C.B. telephone instruments	Demolition & Construction Co. Ltd.
"Cycloc" automatic battery charging rectifiers	Ericsson Telephones Limited
Signal telephone pedestals and cabinets	The General Electric Co. Ltd.
Polythene insulated and sheathed cables	Harmer & Simmonds Limited
Half minute impulse electric clocks	Hubbard Brothers
Installation of signalling cable route, Herne Hill-Shortlands area	The Telegraph Construction and Maintenance Company
	Gent & Company
	United Kingdom Construction & Engineering Co. Ltd.

WHITSUNTIDE ROAD CASUALTIES.—Reports received by the Ministry of Transport and Civil Aviation show that 73 people died as a result of road accidents in England and Wales during the Whitsun holiday week-end, from the Friday to the Monday inclusive. This is five more than during Whitsuntide, 1958, when, however, there was not nearly so much traffic on the roads.



*Signalling floor in Beckenham Junction Signalbox, showing layout of equipment*



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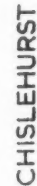
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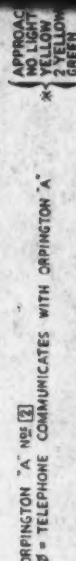
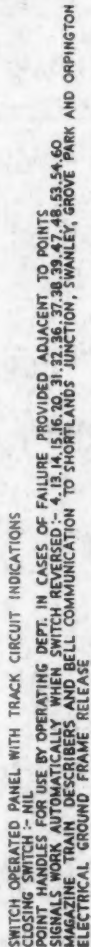
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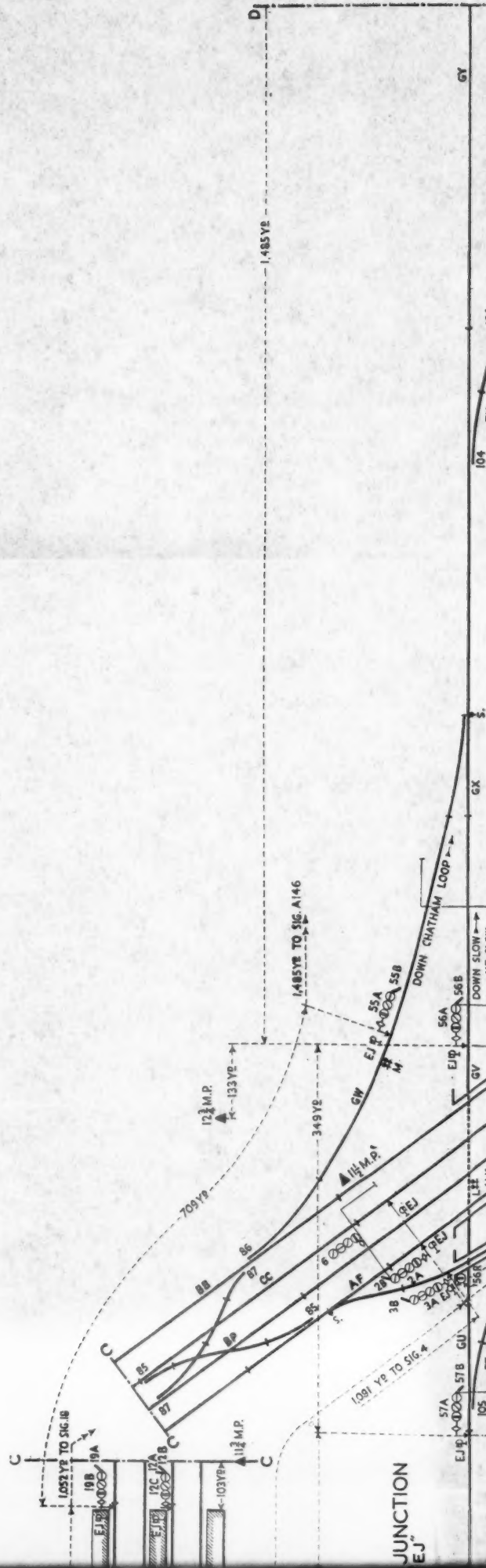
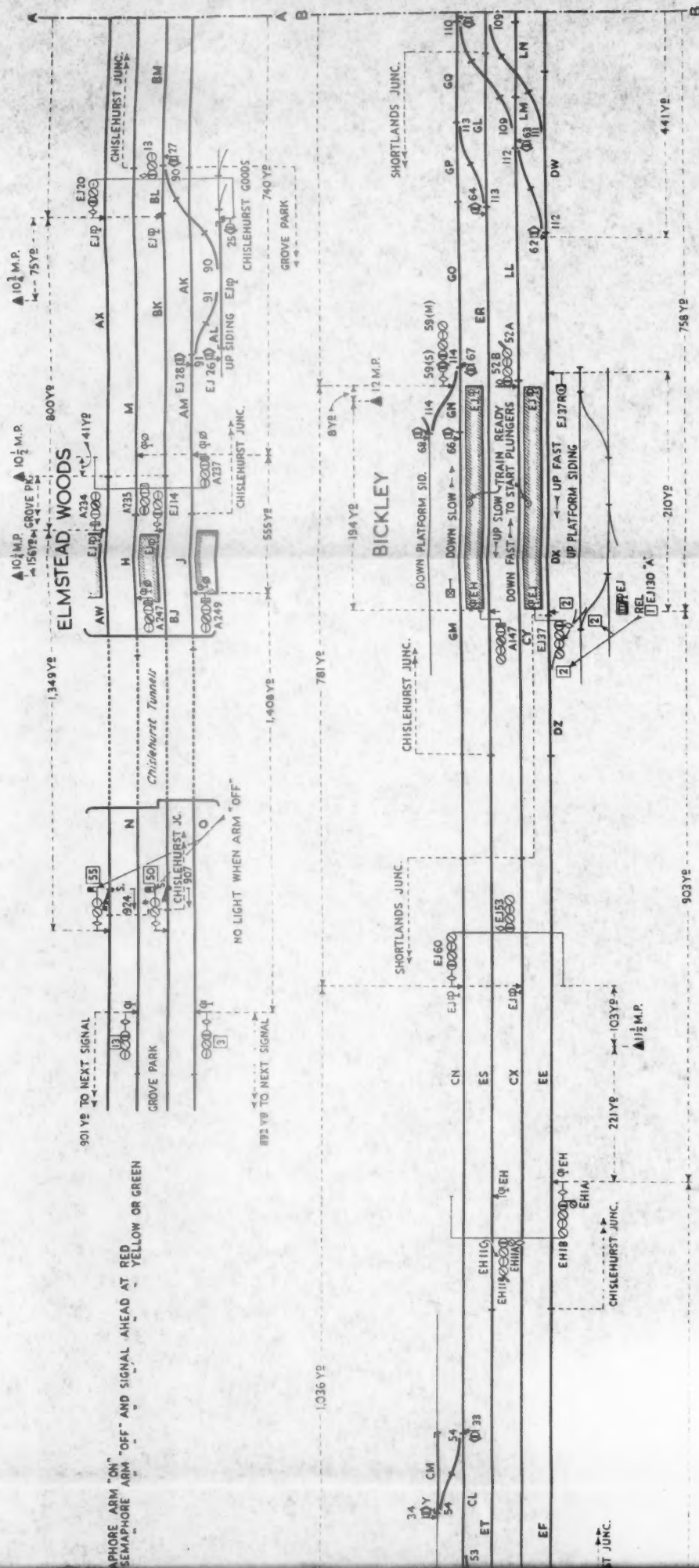


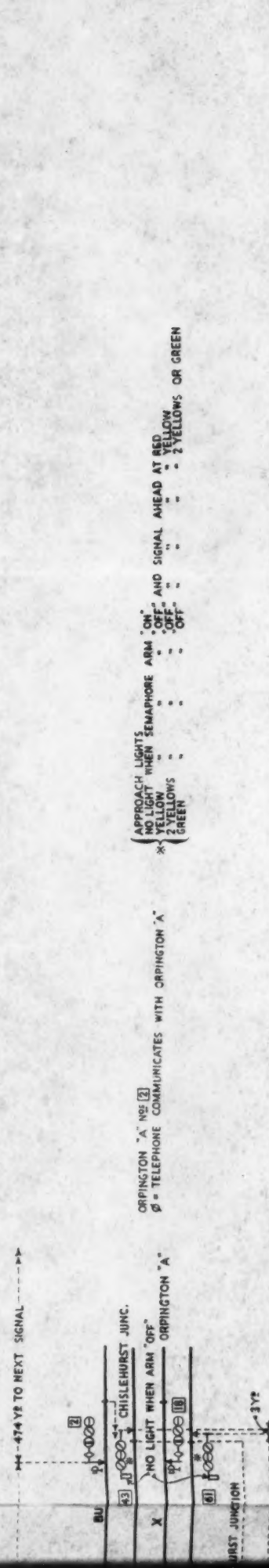
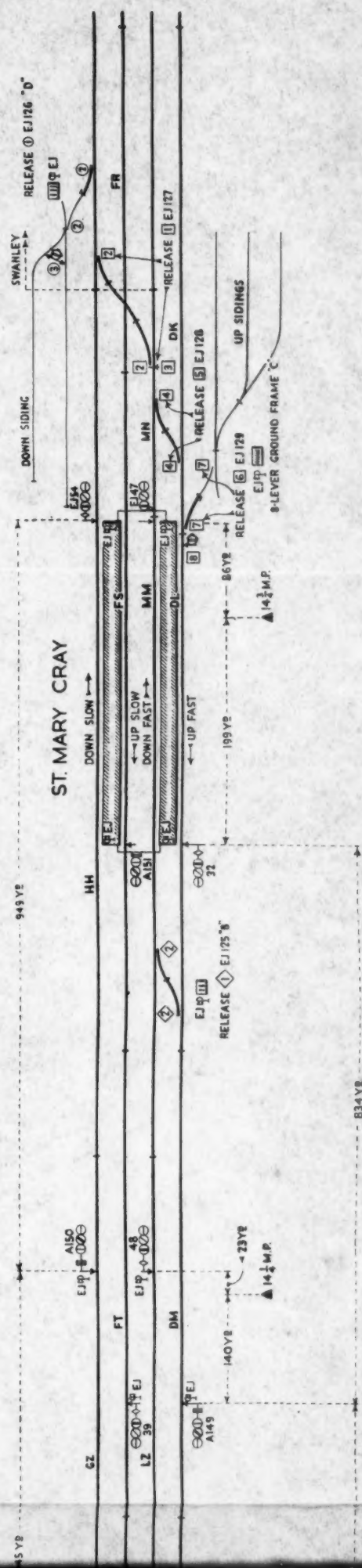
CHISLEHURST JUNCTION  
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## ARRANGEMENTS







APPROACH LIGHTS	ARM	ON	AND SIGNAL AHEAD AT RED	YELLOW	OR GREEN
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YELLOW	"	OFF	"	"	"
2 YELLOWS	"	OFF	"	"	"
GREEN	"	OFF	"	"	"

ORPINGTON "A" No. 2  
Ø = TELEPHONE COMMUNICATES WITH ORPINGTON "A"

43 CHISLEHURST JUNC.

X NO LIGHT WHEN ARM "OFF"

ORRINGTON "A"

**W CHISLEHURST JUNCTION SIGNALBOX. ARRANGEMENTS ARE TYPICAL OF THOSE BEYOND GILLINGHAM**

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## RAILWAY NEWS SECTION

## PERSONAL

Mr. T. G. Gibb, Divisional Manager, North Eastern Division, British Road Services, Leeds, has been appointed General Manager of British Road Services. He will succeed Major-General G. N. Russell when the latter becomes a member of the British Transport Commission on October 1.

Mr. John Pollard, T.D. District Traffic Superintendent, Stoke-on-Trent, London Midland Region, British Railways, who as recorded in our May 22 issue, has been appointed Assistant Divisional Traffic Manager, Birmingham, began his railway career with the L.M.S.R. at Stacksteads, Lancashire, in 1934. Mr. Pollard gained experience at various stations, before being commis-

Mr. E. J. Hughes has been appointed Assistant Chief Accountant of the Malayan Railway.

The Road Haulage Association Limited announces the following appointments:—Mr. R. N. Ingram, W. R. Ingram Limited, re-elected National Chairman, and Messrs. H. H. Crow, Crow Carrying Co. Ltd.; D. O. Good, Pioneer Haulage Limited; J. B. Mitchell, Scottish Central Carting Co. Ltd.; and N. T. O'Reilly, appointed National Vice-Chairmen.

Mr. E. A. Talbot, A.M.I.Mech.E., M.I.Loco.E., District Motive Power Superintendent, Saltley, London Midland Region, British Railways, who as recorded in our May 29 issue has been appointed District

Mr. K. W. C. Grand, a member of the British Transport Commission, has been nominated to the Coastal Shipping Advisory Committee to replace Mr. A. B. Valentine, who has resigned.

Mr. A. Higginson, District Traffic Superintendent, Barrow, London Midland Region, British Railways, retires on June 30.

Mr. E. J. Hughes, A.M.Inst.T., Accountant, Ports Department, Malayan Railways, has been appointed Assistant Chief Accountant, Malayan Railways. Mr. Hughes was born in Belfast, Northern Ireland, in 1925, and educated at the Holy Family School, Belfast and St. Kierons College, Bray. He joined the Accounts Branch of the Northern Counties Committee,



Mr. J. Pollard

Appointed Assistant Divisional Traffic Manager, Birmingham, L.M. Region.



Mr. E. A. Talbot

Appointed District Motive Power Superintendent, Birmingham, New Street, L.M. Region



Mr. E. J. Hughes

Appointed Assistant Chief Accountant Malayan Railways

sioned in the Lancashire Fusiliers (Territorial Army) in 1939. He served in France, Belgium and the Middle East, and rejoined the Territorial Army in 1947. In July that year he completed a Traffic Apprenticeship and was appointed Assistant to the District Operating Manager, Crewe. In 1951, he became Assistant District Operating Superintendent, London (Midland). In 1954, Mr. Pollard moved to a similar position, in the London (Western) District. He was appointed District Operating Superintendent, Stoke-on-Trent, in 1956 and in January, 1958, he took up the newly created position of District Traffic Superintendent, Stoke, the position he now vacates. During the winter of 1955-56, he was one of a party of four British Railway representatives who spent three months studying modernisation of the French Railways.

Mr. W. P. Mullen, General Manager, Chamberlain Plant Limited is making a business trip to European and Mediterranean countries.

Mr. D. C. Coates has been appointed General Manager, Contractor's Plant Department (Southern Area), Thos. W. Ward Ltd. He succeeds Mr. W. B. Spencer who has relinquished the appointment on medical advice. Mr. E. L. Ward becomes Sales Manager.

Motive Power Superintendent Birmingham, New Street, will be responsible for the Motive Power Depots at Bescot, Ryecroft (Walsall), Bishbury (Wolverhampton), Monument Lane and Aston (Birmingham), in addition to the depots at Saltley and Bournville. Mr. Talbot commenced his career as a privileged apprentice at the Derby Works, former Midland Railway, and gained experience at the Nottingham, Lincoln, Rowsley and Peterborough Depots. He was appointed a junior assistant to the Divisional Motive Power Superintendent, Derby, in 1932, and, seven years later, was transferred to the Bristol, Barrow Road Depot, as Assistant District Motive Power Superintendent. In 1946 he was promoted to be Assistant to the Divisional Motive Power Superintendent, Hunts Bank, Manchester, Central Division. Mr. Talbot was appointed District Motive Power Superintendent, Saltley, in 1947, the position he now vacates.

Mr. L. S. Tredgett is appointed Assistant Sales Manager, Railway Signals Department, Metropolitan-Vickers Electrical Co. Ltd.

Mr. H. G. C. King, Pattern Shop Foreman, Crewe Works, London Midland Region, British Railways, has been awarded a diploma by the Council of the Institute of British Foundrymen for his paper "An Introduction to Pattern-making in plastics."

in 1943, and later served with the Ulster Transport Authority. In February, 1954, Mr. Hughes joined the Malayan Railway as Accountant and subsequently served as Paymaster, Accountant, Civil Engineering Department, and Accountant, Ports Department. Mr. Hughes was Secretary to the Cargo Handling Corporation, Port Swettenham, in 1955.

Mr. G. P. Sumner, Area Accountant, Midland Parcels Area, British Road Services, has been appointed Budgets Officer, Chief Financial Officer's Department, Headquarters.

Mr. J. Maurice Laing has been appointed Chairman of the Federation of Civil Engineering Contractors. He succeeds Mr. E. C. Beck. Mr. A. J. Hill becomes Vice-Chairman.

Mr. George Edlington has been appointed Export Manager for Bernard Wardle (Everflex) Limited.

Mr. G. H. Pirie, a Director of the General Steel & Iron Co. Ltd., has been elected Mayor of the City of Westminster.

Mr. W. H. Mayall, Mechanical Engineer, Tiltman Langley Limited has been appointed Industrial Officer for Engineering Industries, Council of Industrial Design. He succeeds Mr. L. A. Grosbard.

## NEW EQUIPMENT AND PROCESSES



### Digital Voltmeter

**THE** LM.901 "999" digital voltmeter displays measured voltage in large figures, which may be read at considerable distance from the instrument and by untrained personnel.

Transistorised, the unit is lightweight and compact yet strongly constructed. It is completely self-contained, and power consumption is extremely small. It can be used independently or as a module in large installations.

Voltage range is from zero to 99.9V in three sub-ranges, or 109.9V when using the range extension facility. Measured voltage is continuously monitored and readings change with any variation. Alternatively, varying voltages may be periodically measured. Absolute accuracy is better than 0.1 per cent short term, or 0.25 per cent long term.

Further details can be obtained from the Solartron Electronic Group Limited, Thames Ditton, Surrey.

### Multi-Purpose Stretcher

**THE** Mercia Stretcher is designed to meet the need for a multi-purpose unit to enable rescue personnel to deal with almost

any situation. It has all the advantages of the standard pattern plus additional features which give full security to the patient at all angles and complete confidence to the handlers. Once the patient is in position there is absolutely no necessity for him to be removed until hospital is reached.

The stretcher consists of a light tubular frame construction with five angled rungs which protect the patient's back and act as additional hand grips. If the stretcher is lowered to the ground, the rungs afford protection to the patient against any liquid or rubble which may be lying underneath. Telescopic handles permit easy handling in the normal position by two bearers and, when these are retracted, the stretcher can be carried by two bowed rungs around the head and the feet. If four bearers are used, the stretcher is carried by its side members.

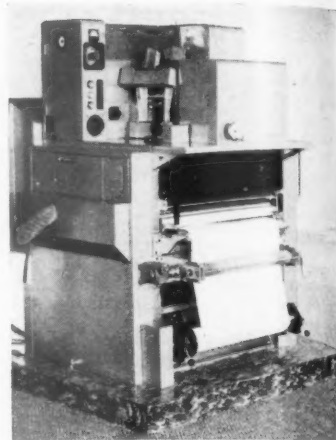
A stout canvas container, secured to the frame by five strong webbing straps, completely enclose the patient who thus can be raised, lowered, or turned to any position. The patient can be placed with his head at either end of the stretcher. Straps can be adjusted to suit any form of injury. The container is capable of taking a patient of a height of 6 ft. 4 in.

Weight is 22 lb. Overall length is 6 ft. 3 in. and finish is black, white, or aluminium. Price is £12 12s. ex works, and subject to discount for quantities. Delivery is from two to three weeks from receipt of order.

Further details can be obtained from the manufacturer, J. Nesbit-Evans & Co. Ltd., St. Oswald's Road Gloucester.

### Adhesive for Foam Rubber

**S.** 834 is a new adhesive for bonding natural and synthetic foams suitable for use in the upholstering of railway carriages. It is a white adhesive comprising plasticised synthetic rubbers in a blend of non-toxic solvents, and gives a particularly strong and flexible bond. Prices and further details can be obtained from the Dunlop Rubber Co. Ltd., Compositions Division, Chester Road, Birmingham.



### Drawing Reproduction

**COPYFLO** is a new system of reproducing large numbers of engineering drawings. Working by electrical photography, it can copy engineering drawings on low-cost, unsensitised paper, producing 20 ft. of prints a min.

Three techniques — microfilm, punched cards, and xerography — are combined to form the unitised microfilm system. The original is drawn on cartridge or tracing paper, microfilmed, and processed. The film is cut into single frames and each frame is mounted in a "Filmsort" punched card.

Cards can be located rapidly and fed into an enlarger which produces high-quality, permanent prints up to 24 in. wide by xerography which, being a completely dry process, delivers prints ready for immediate use.

The following advantages are pointed out: quick and low-cost production, (cost in materials is less than 1d. a sq. ft.); the production from each card of a single enlargement or specified numbers of enlargements; production from roll microfilm, or direct from original documents, roll microfilm, or half-plates.

Further details can be obtained from Rank-Xerox Limited, 33-41, Mortimer Street, London, W.1.

### Metallic Lead Primer

**PITAN** Metallic Lead Primer, on iron and steelwork, forms a blanket of metallic lead and seals against electrochemical activity. Lead soaps are formed which combine to give excellent adhesion and restrict the spread of any existing corrosion.

Laboratory tests show a tendency for corrosion products to be absorbed and, to some extent, somewhat reduced. Because of this, traces of firmly adherent rust have no deleterious effect on performance of the primer.

Good flow-out properties eliminate the danger of corrosive attack at the area of low film thickness occasioned by bad brush marks and other causes of poor levelling.

The product is available in 7 and 14 lb. tins at 3s. 6d. lb. Material cost per sq. ft. is approximately 1d.

Further details can be obtained from the manufacturer, Allweather Paints Limited, 36, Great Queen Street, London, W.C.2.



## Beyer, Peacock & Co. Ltd. Development and Expansion

The annual general meeting of Beyer, Peacock & Co. Ltd. was held on June 5 in London, Mr. Harold Wilmot, C.B.E. (Chairman & Managing Director) presiding.

The following is an extract from his circulated review:

The accounts for the year 1958 indicate continued financial strength and liquidity. The difference in the excess of current assets over current liabilities may not be considered significant, but the detail of debtors, stocks and work-in-progress and creditors all indicate a reduction in over-all Group factory activity. This was the final point I made in my last review. As then visualised trading has been seriously affected by international conditions, and the fears then expressed have been confirmed. The reduced profit reflects a combination of less activity and lower prices.

Group development has continued. With a view to further diversification the Company acquired the whole of the equity of Air Control Installations Limited. For the same purpose the equity capital of B.J.N. Engineering Co. Ltd., was also acquired.

Your board do not propose any further acquisitions of the above nature in the current year.

### Success of New Company

In my last review I mentioned the formation of a company, Beyer Peacock (Hymek)

Limited, to promote the sale of diesel hydro-mechanical locomotives. The order book of this new company already runs into some millions of pounds.

This year we hope to consolidate our Group organisation. With this in mind we propose to operate the parent company as a holding company whose board will thus be relieved of much detail and so be able to give more adequate consideration to important aspects of Group policy.

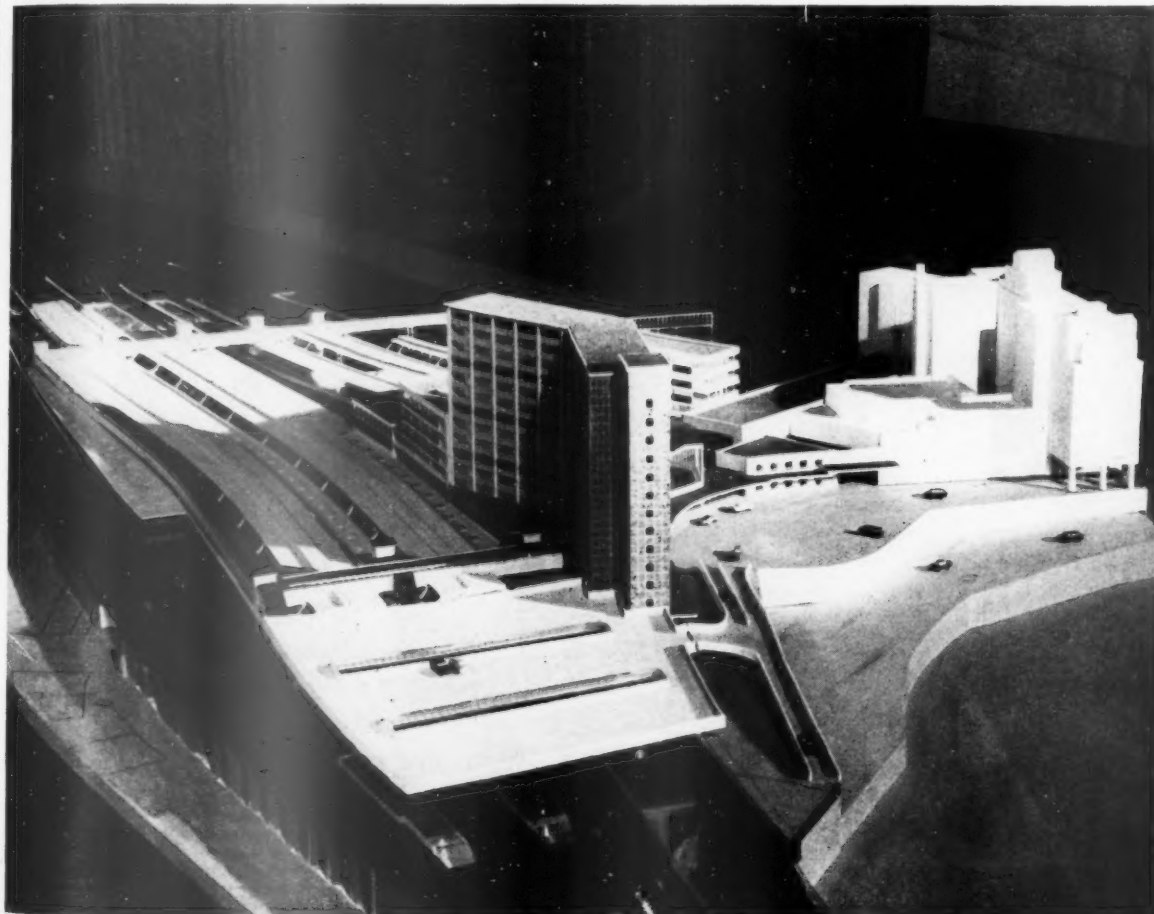
Your board has most carefully considered the question of dividend and bonus in respect of the 1958 accounts. An interim dividend of 3 per cent was declared on January 30, 1959. As the result of professional advice, and in order to achieve considerable tax economy, no final dividend or bonus for 1958 has been declared. Instead the board decided to declare an immediate interim dividend for 1959 of 9 per cent, which will be paid on June 5. In order that the total distribution for 1958 and 1959 shall not be unreasonable in relation to the facts, and unless the accounts for 1959 are considerably worse than is at present expected, a final dividend for 1959 of not less than 12 per cent will be declared as soon as the accounts for 1959 have been audited and subject to approval in general meeting. It should be understood that the above conception of a distribution programme is on the assumption that the board may feel satisfied in due course that at least 10 per cent will be earned in the year 1960.

It is difficult to forecast the future. The year 1958 was a year of diversification.

1959 will be a year of consolidation. Order books are filling up, and in the absence of unexpected deterioration it may be not unreasonable to expect that for 1960 and the following few years your company should enjoy some measure of all-round benefit from improving general trade.

The report was adopted.

**Western Region Train Alterations.**—Certain changes are announced by the Western Region in the train services due to begin operation on June 15. Buffet cars will not be attached to the 7.5 a.m. from Cheltenham to Paddington, and the 2.15 p.m. from Paddington to Cheltenham, nor to the 11.45 a.m. from Birkenhead to Paddington and the 2.10 p.m. from Paddington to Birkenhead, as between Birkenhead and Wolverhampton, though the two last-mentioned will retain their restaurant cars between Paddington and Wolverhampton in each direction. The train services shown in the Western Region timetable book between Leamington Spa and Rugby and between Chelsey & Moultsford and Wallingford have been withdrawn, and that between Gloucester and Ledbury will be withdrawn after July 11. Some 20 additional trains will call daily at Creech St. Michael halt (Taunton). On Sundays, Bedworth and Chilvers Coton stations, between Nuneaton and Coventry, will be open as on weekdays, and all trains will call at both.



General view from south-east of proposed combined station at Leeds (see editorial this week). Illustration shows car park, through platforms, and rear of development block



### A.E.R. at Longmoor

A VISIT was paid on June 3 to No. 19 Railway Regiment, Royal Engineers, Army Emergency Reserve, at Longmoor, Hampshire. The units in camp, on two-week annual training, were 150 Railway Squadron (Eastern Region, British Railways), and 153 Railway Squadron (North Eastern Region, British Railways). They are part of 17 Railway Group, R.E., A.E.R. No. 345 Construction Squadron, R.E., A.E.R., was also in camp, as well as No. 7 Movement Control Group, R.E.; the latter was engaged on a separate programme of training and exercises.

In addition to routine military training the first week included, for the first time, nuclear-warfare instruction and first aid. The Barrington-Ward Cup was won, this year, by 153 Squadron. The cup is awarded annually to the unit judged to be "superior on all aspects of the first week's training."

During the second week, No. 19 Railway Regiment took over the Longmoor Military Railway entirely. In addition to meeting the regular passenger and freight commitments, an exercise scheme "Knight Errant" was superimposed. For this purpose a nuclear bombardment of Portsmouth had been assumed. Because of a supposed interruption of the Southern Region main line, the civilian railway was assumed to hand over all military traffic to the L.M.R., at Bordon. The military railway worked this forward to Liss, for onward delivery by the civilian railway. The exercise included the preparation of working timetables, engine- and stock-working diagrams, personnel rostering.

The construction troops of 150 and 153 Squadrons, augmented by 345 Construction Squadron, were allocated the task of re-arranging the track layout at Oakhanger Station, to obviate double-line working across the public highway, in accordance with Ministry of Transport requirements. A ground frame was abolished and the turn-outs put in, operated from a newly-constructed signalbox, with mechanical interlocking frame of 16 levers.

The officers and other ranks in camp, May 25 to June 6, were mostly from the

Eastern and North Eastern Regions, British Railways. Every man this year was a volunteer; many had considerable wartime military railway operating and engineering experience.

### Northern Ireland Summer Timetables

Various train service improvements are announced by the Ulster Transport Authority to operate during the summer season. They include the longest and fastest regular non-stop run ever yet tabled over the lines of the former Northern Counties Committee. On Saturdays from July 4 to August 30 there will be a non-stop diesel train at 8.20 a.m. over the 92½ miles from Belfast to Londonderry in 100 min. (55.7 m.p.h.). In other respects the Saturday service will follow last summer's pattern.

In the reverse direction the 3.15 p.m. from Londonderry will start at 3.5 p.m. and run 10 min. earlier, followed by a 3.15 p.m., which will call at all principal stations and not be due in Belfast till 5.45 p.m. The 8.35 a.m. diesel train from Londonderry to Belfast now covers the 31 miles from Ballymena to Belfast in 31 min., and there will be other runs over this section in 32 min., while there are many bookings each way over the 12.2 miles between Castlerock and Limavady Junction in 12 min. (61 m.p.h. start to stop).

On the former Great Northern main line, the 6.10 p.m. from Belfast, Great Victoria Street to Dublin is to start at 6 p.m., and until September 6 there will be additional trains from Belfast to Dublin at 3.45 p.m., and from Dublin to Belfast at 7.30 p.m. From June 20 to August 29, to enable connection to be made with the steamer arriving from Ardrossan, the 2.20 p.m. from Belfast (Great Victoria Street) to Londonderry via Omagh will start at 3.15 p.m. A much-expanded service will run between Belfast and Warrenpoint on Sundays. Diesel trains will maintain a half-hourly service throughout the day between Belfast, Queens Quay and Bangor, over the former Belfast & County Down Railway.

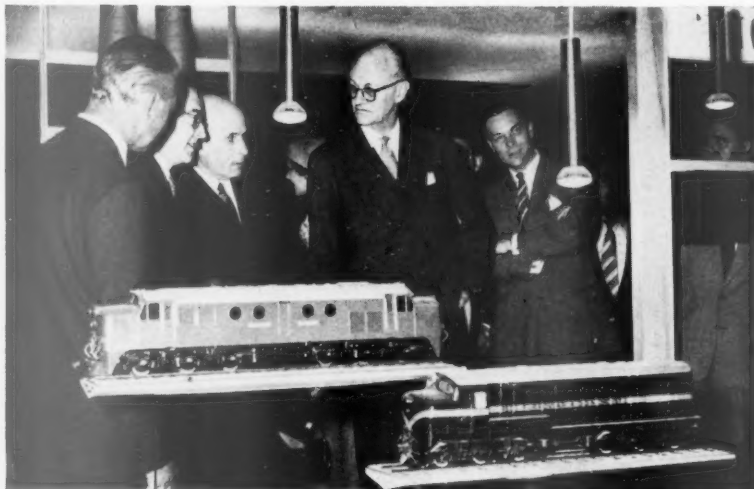
### Notes and News

**Firth Cleveland Limited Report.**—Profit made by Firth Cleveland Limited during the 14-month period ended December 31, 1957, was £1,854,050 before taxation. This shows a lower annual rate of earnings than in the previous year, partly attributable to the reduced turnover of the steel companies. The high level of output of fastenings by Simmonds Aerocessories Limited in the second half of 1958 is continuing.

**Passenger Train Service Withdrawals in L.M. Region.**—The passenger train service between Wellingborough and Higham Ferrers, British Railways, London Midland Region, is to be withdrawn from June 15 because it is unremunerative. Passengers for Rushden and Higham Ferrers may book to Wellingborough Midland Road and proceed thence by bus. Parcels, passenger train merchandise and goods traffic for these stations will continue to be dealt with as hitherto. Passenger trains between Rugby and Leamington, in the same Region, also will be withdrawn from June 15. Passengers should book to Rugby or Leamington Spa, according to direction of travel, and continue by bus. Parcels and passenger train merchandise will be dealt with at Rugby, and the present arrangements for goods traffic at Dunchurch and Marton will continue.

**Preventive Maintenance.**—The subject of a series of three-day seminars to be held this autumn by the British Institute of Management, in collaboration with the British Productivity Council, will be Preventive Maintenance. Mr. Robert B. Wilson, at present acting as a consultant to the European Productivity Agency, will act as leader on each occasion. These seminars are intended for factory engineers, plant engineers, production managers, and planning managers who are either actively responsible for a preventive maintenance system and wish to ensure that the maximum benefit is being derived, or are considering the installation of such a system and wish to be fully informed on current thought and practice. The number attending each seminar is limited to 25. Places and dates are: London, September 29 to October 1; Glasgow, October 14-16; Manchester, October 21-23.

### English Electric at B.I.F. Lisbon



The President of Portugal, Admiral Americo Tomaz, at the British Industries Fair, Lisbon, inspecting models of diesel-electric locomotives built by the English Electric Co. Ltd. On his right is Mr. L. H. Short, the company's Director of Overseas Operations, and on his left the British Ambassador, Sir Charles Stirling

### OFFICIAL NOTICES

#### BENGUELA RAILWAY COMPANY

At the Annual General Meeting of the Company held in Lisbon on May 30, 1958, the following distribution of profits for the year 1958 was approved:—

	1958	1957	1956
	Escudos	Escudos	Escudos
Net Revenue	151,344,921	194,846,285	221,811,958
Deduct:			
Percentage to Portuguese Government, 13.945,843			
Deductions in accordance with the Articles of Association,	10,443,698	24,389,541	35,183,493
			41,478,879
Balance available for distribution	126,955,380	159,662,792	180,333,879
Distributed as to:			
Debt Service			
Redemption of 4% Debentures	16,299,640	16,294,810	49,248,290
Interest on 4% Debentures for year 1958	9,011,621	9,663,413	11,633,345
Interest on 5% Debentures for year 1958	16,100,000	16,100,000	16,100,000
	41,411,261	42,058,223	76,981,635
Dividend of 12½% on Share Capital	82,500,000	99,000,000	49,500,000
Transferred to General Reserve	—	—	53,852,244
Transferred to Dividend Equalisation Reserve	3,044,119	18,604,569	—
	126,955,380	159,662,792	180,333,879

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